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ORIGINAL COMMUNICATIONS.

A CONTRIBUTION TO THE CLINICAL STUDY OF INTRATHORACIC TUMORS.[1]

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ACCURATE knowledge regarding mediastinal and other intrathoracic tumors dates from a very recent period, notwithstanding the fact that a number of the older authorities had recorded observations, and had invited attention to their study. Of the mediastinal growths recorded, the earliest is probably that of Boerhaave, of a steatoma of the anterior mediastinum, reported in 1742. It is probable, however, that a similar observation had been made even earlier than this, in the beginning of the seventeenth century, by Willis. After Boerhaave, Lieutaud described several cases in 1787; Boyle still further increased the number in 1812, and Lobstein contributed to their more general recognition by the description in his textbook published in 1835. The number of cases since recorded has been very considerable, as may be seen from the facts that Hare was able to tabulate over two hundred and seventy-nine cases of tumors of the mediastinum alone; that Strauscheid analyzed one hundred and twelve; and that among seven thousand five hundred and sixty-six autopsies at the Marine Hospital of Kronstadt, one hundred and fifty-eight were said to have disclosed malignant mediastinal tumors. Nevertheless the number of cases coming under the observation of any one observer has always been limited, and

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opportunity for accurate clinical study of the various forms and of the successive stages is, therefore, restricted.

VARIETIES.

The forms observed include sarcoma, lymphadenoma, carcinoma, fibroma, lipoma, enchondroma, osteoma, dermoid and hydatid cysts, and the rare variety described by Virchow under the name of teratoma myomatoides. The epitheliomata may be reckoned with the carcinomata; the endotheliomata with the sarcomata. Of all of these forms the cancers, sarcomas, and lymphatic tumors alone occur with sufficient frequency to merit great consideration from a clinical point of view.

The attempt to determine which of the two prominent forms, cancer or sarcoma (for we do not regard it as practicable or possible to separate and distinguish lymphadenoma from sarcoma), is the more common has been repeatedly made, and the results of different observers are strikingly at variance. Hilton Fagge writes that the "vast majority of them are composed of small round cells, and are classified by some observers as 'lymphomata,' by others as round-celled sarcomata." Powell regarded cancer as extremely rare, and pointed out the fact that many of the cases recorded as cancers were probably sarcomata. On the other hand, some of those who have compiled statistics have come to the opposite conclusion. Of Strauscheid's one hundred and twelve cases, forty-six were carcinomata, thirty sarcomata, and eight lymphomata. Of Hare's cases, one hundred and thirty-four were cancers, ninety-eight sarcomas, and twenty-one lymphomas or lymphadenomas. Our own opinion coincides so closely with that of Fagge and Powell that we have been led to examine with some care the statistical tables of the two above-named authors, and others who have compiled and tabulated cases. The monograph of Hare, containing the largest collection of cases, has particularly excited our attention. It interested us to note, at the first cursory examination of his tables, that for the most part the tabulated cases of cancer antedate those of sarcoma by at least twenty years; and on counting them we found that of the former sixty-one were reported before 1870, and forty-one after that date (in thirty-two the date is not stated in the essay); while of the latter only three were recorded before 1870, and sixty-six subsequent to that year (in twenty-four the date is not given). In other words, the greater number of cases of cancer were observed and recorded when the term cancer was used with notorious laxity; while the sarcomata (omitting the ones in which no date is given), with three exceptions, fall within the period in which observers everywhere distinguish with care between the epithelial and the connective-tissue growths. It is apparent, therefore, that but little value can be attached to conclusions based upon the earlier cases, unless a most careful examination of the microscopic features, and the details of the appearance and manner of growth recorded in each instance, be made and all imperfectly reported instances be excluded. It is questionable, however, whether

the enormous labor such a study would entail would be repaid by the results arrived at. We have, nevertheless, taken the trouble to investigate in this way twenty-five of the older cases reported by their respective authors as cancer, and find in thirteen of these unquestionable evidence of the sarcomatous nature of the disease described; and in the other twelve we were, for the most part, unable to decide. In but one or two were we convinced from the description that the tumor was carcinomatous.

As far as our own cases are concerned, we find of the nine recorded in this paper six were unquestionably sarcomata, and one was unquestionably secondary cancer; of two cases reported some years ago, one was probably a sarcoma of the anterior mediastinum, and the last, though reported to be a cancer by those who made the microscopic examination, was not recorded with the detail we could desire, and the specimen has in the intervening years been lost or destroyed. Omitting these two older cases, there are left the six sarcomata and one secondary cancer. In addition we have studied three other cases of primary mediastinal sarcoma not here reported because clinical notes have not been preserved. This will be found to be representative of the experience of the other observers who have recorded cases within recent years. We do not hesitate, therefore, in the slightest to say that primary sarcoma is overwhelmingly the commonest tumor of the thoracic cavity; and that cancer, even if cancer of the lung not invading the mediastinum be included, is exceedingly rare. We do not include in this discussion instances where small nodules of secondary sarcoma or cancer are found in the lungs or other thoracic organs; but confine our attention to the instances where either single or multiple tumors have reached such size as to merit description as intrathoracic tumors in a clinical sense.

We must recur again to the question of the classification of the tumors spoken of as lymphomata and lymphadenomata; and also of the relation of the latter to leukæmia and Hodgkin's disease. There is, perhaps, no more difficult or obscure question in pathology. Histologically there is no practical difference, if any, between these growths and those which are commonly designated as lympho-sarcomata. There is, however, a wide difference in appearance between the masses of apparently enlarged glands on the one hand, and the large, more or less regular, and infiltrating growth on the other. There is also an evident gross difference between the localized mediastinal tumor and the widespread malignant lymphoma of leukæmia, or Hodgkin's disease, with associated mediastinal involvement. Perhaps, however, after all, the difference is only apparent and dependent upon the point of origin and the local or general diminution of power to resist. Virchow first directed attention to the fact that sarcomatous tumors originating in the remnant of the thymus gland present a more or less regular outline, while such as take their origin from the lymphatic glands of the mediastinum are nodular and irregular. It is the latter that conform to the description of lymphoma, and that are associated with Hodgkin's disease and leukæmia; but cases of the former variety may like-

wise present the clinical manifestations of the diseases mentioned. Thus in a case reported very recently by Palma, a tumor of the anterior mediastinum, which doubtless sprang from the thymus gland, was first regarded in its clinical relations as an instance of Hodgkin's disease, and later there were all of the hæmatological characteristics of leukæmia. A somewhat similar case has been recorded by Eger; and several of the systematic writers, among them Eichhorst, regarded this association as established. In our own opinion there is little doubt that Hodgkin's disease and leukæmia may occur with no other gross lesion than a lymphadenomatous or lympho-sarcomatous tumor of the thymus or lymphatic glands of the mediastinum.

POINTS OF ORIGIN.

Fagge has well remarked that in the later stages it is often difficult, if not impossible, to determine the tissue or structure in which an intrathoracic tumor took origin; but there are numerous instances in which the growth remains so limited in size that the point of origin can readily be made out.

In the first place, it may be noted that tumors of the anterior mediastinum are three or four times as common as those of the posterior mediastinum; and it is not difficult to decide upon the structure from which they most commonly arise.

Thymus Gland.—As has been remarked, Virchow pointed out that sarcomatous tumors of the anterior mediastinum having a regular outline are thymic in origin; and recent observers, particularly Letulle, have argued for a still more frequent occurrence of this place of origin than Virchow believed. New growths of the lymphatic glands, of the fatty or other mesoblastic tissues of the anterior mediastinum, enchondromata, osteomata, and syphilitic gummata springing from the periosteum or bones of the chest walls, all undoubtedly occur, but they are rare. The immense majority of tumors would seem to spring from the remains of the thymus gland. This was undoubtedly true of three of our cases, one here reported and two in which the clinical notes have been lost. In another it was very likely the case. To the *a priori* probability of a tumor originating in the *locus minoris resistentiæ* furnished by the atrophic organ in question, there may be added the more positive evidence afforded by the shape of the growth itself. In two of our cases, one of which is illustrated in the drawing (Plate I.) presented, the largest mass, and therefore that which was probably the primary growth, was divided into two lateral portions which extended downward, tongue-like, over the roots of the great vessels and the base of the heart. The most careless inspection of this tumor could not fail but suggest the likelihood of its being a much enlarged thymus gland.

As to the nature of the new growths occurring in this situation, it is of importance to recognize the histologic construction of this organ. There is,

as is well known, a superabundance of lymphoid tissue with a certain amount of endodermic epithelium. The tumors supposed to take origin here may readily be surmised. They are almost exclusively lympho-sarcomata; but the epithelial remnants seem occasionally to be involved, and a few observers, as Letulle, Danzac, and Horstmann, have described epithelial neoplasms arising from these cells. Very rarely other growths, such as cysts or lipomata, have been observed.

Lymphatic Glands.—Next to the thymus gland, the lymphatic nodes are the most common seat of intrathoracic tumors. It may be those of the anterior mediastinum that are affected; but the groups surrounding the lower part of the trachea and the bronchi, and extending into the roots of the lungs, are more commonly involved. They occupy, therefore, the posterior and middle mediastina. The nature of these tumors, when primary, is practically always the same,—lymphomatous or lympho-sarcomatous. There may be widespread lymphatic involvement in all parts of the body, or the thoracic tumor may be alone observed. In two of our observations this was positively the case; in a third it was probable. In a fourth case, here recorded, the tumor was a secondary carcinoma of the peribronchial glands.

Secondary carcinoma of the mediastinal glands is not uncommon, but it rarely occasions masses of sufficient size to be ranked with intrathoracic tumors in a clinical sense. In the case to be reported below this was, however, the case. It is of interest to consider the mode of propagation of cancer from the abdomen (as in our case) to the glands of the chest. The subject has been fully studied by Girode, with whose conclusions we are entirely in accord. Extension, according to this author, may occur by vascular embolism; by direct extension of the disease to the under surface of the diaphragm, through which it penetrates along the lymphatics upward into the chest and glands; and, finally, there may be embolism through the thoracic duct to the chest and then by retrograde embolism to the glands.

Pleura and Lungs.—Very important and interesting tumors are found arising from these structures. We are particularly concerned with the pleural forms, because our experience has been more largely in this direction. One of the most interesting of all tumors is that which has been variously thought to belong to the group of carcinomata or of sarcomata, and which has been designated endothelioma by Wagner, and later by Schulz. All observers are practically agreed that whether it be found in the peritoneum, pleura, or pia mater, the origin may be found in the endothelial cells of the lymphatic vessels, or possibly, at times, the surface endothelium. Opinion varies, however, as to the nature of the growth. To all intents it is indistinguishable from carcinoma in microscopic appearance, though some observers have claimed for it certain distinguishing features in the shape and character of the cells. In our own case (see Plate V.) the cells are in many places distinctly columnar or cylindrical, and even

cuboidal. A characteristic, however, of these growths is the formation of the long columnar structures, which are evidently lymphatic channels filled with proliferated endothelial cells. The whole question of the nature of this growth depends upon the view which we shall take of the embryological origin of the endothelium, for we believe there are few to-day who consider it possible that epithelial tumors may arise from mesoblastic cells. If, then, the more common belief that the endothelium is mesoblastic is correct, and we incline to this view, the endotheliomata are certainly to be classified with sarcomatous tumors; but if the theory of Hertwig of the endodermic origin of the endothelium, to which Balfour and other embryologists more or less conform, be founded in fact, these tumors must be accounted carcinomatous.

The instances recorded in literature as primary cancer of the pleura are probably mostly endotheliomata. Of such Neelsen was able to collect four undoubted instances, and added a fifth. In addition, he gave a partial description of another in the Pathological Museum at Rostock, and referred to three other imperfectly reported and questionable cases in literature. Birch-Hirschfeld has described one in his text-book, and Coats, of Glasgow, described one coming under his notice. Recently Stewart and Adami, of Montreal, have reported, under the title of "Angiosarcoma," what may not improbably be a variety of the same form of growth. Our own case was presented before the Philadelphia Pathological Society during the past winter, and subsequently two other—certainly similar, if not identical—cases have been exhibited in the same society. Fränkel has also recently described at some length the same form of tumor, basing his study upon a typical case. We have little doubt that many instances have been overlooked, the appearance of the pleura being such that the disease could very easily be mistaken for chronic inflammatory thickening.

The growth is nearly always found in the form of a uniform infiltration of the pleura, the latter having a glistening whiteness. Sometimes a small amount of chylous liquid exudes from the surface of section. Either the costal or pulmonary pleura alone, or both, may be involved, and adhesion of the two reflections is frequently noted. The thickening varies from a few millimetres to several centimetres. The inner surface is usually smooth, but may show nodular elevations or a net-work constituted by the distended and infiltrated lymphatic vessels. The thickened pulmonary pleura may be sharply defined and separable from the underlying lung, or there may be, as in our own case, infiltration of the lung-substance to a considerable distance. Metastasis is not the rule, but may occur.

Of less interest pathologically, though more important clinically because more frequent, are the ordinary sarcomata of the pleura. These may be round-celled or spindle-celled, and tend to involve the lung-structure as well as the ribs and tissues of the chest wall. Dr. Coats has called attention also to a form of subpleural fibro-sarcoma which occurs as a rounded mass covered by the pleura and is particularly common in children.

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PLATE II.

Primary sarcoma of the peribronchial lymphatic glands, invading the root of the left lung. Posterior view, showing the mass in the posterior mediastinum, surrounding the œsophagus and presenting a deep furrow where the aorta was imbedded. Secondary nodes are seen in the pleura.

PLATE III.

View of the same lung laid open by a section from apex to base and from the external surface toward the root of the lung, showing the sarcomatous tumor springing from the lymphatic glands surrounding the bronchus in the root of the lung.

Fibrous, fatty, and calcareous tumors of the pleura are rare.

Of the tumors of the lung we shall have little to say, mainly because our experience in this direction has been limited. In a number of instances we have observed secondary sarcomata and carcinomata, but in none of these did the pulmonary lesion dominate the case. Of the primary tumors the cancers are more common than sarcomata, though there is, not rarely, primary sarcoma of the lymphatic nodes surrounding the bronchi within the lung near the root. (See Plates II. and III.) These are to all intents tumors of the lung itself, but classification is simplified and strict anatomical requirements better fulfilled by regarding them, as we have done, among the tumors of the lympathic glands of the middle and posterior parts of the mediastinum.

To make ourselves perfectly clear, we would point out that the clinical manifestations in such cases are practically the same as in cases where the glands around the bronchi outside the lung are involved, and anatomically these intrapulmonary lymphatic glands belong strictly to the same group as those around the bronchi, outside the lung.

As to the primary carcinomata of the lungs, no little difference of opinion has existed regarding their point of origin. Some observers insist that they spring from the surface epithelium of the bronchi; others maintain that the mucous glands of the bronchial mucosa are the starting-point; while still others regard the alveolar epithelium as the point of origin. It would seem, however, from a dispassionate study of the work done in this field, that each of these views in part expresses the truth. The entire subject, however, requires more extended study based upon modern pathological methods and classification.

Œsophagus.—Finally, the œsophagus is at times the starting-point from which malignant growths invade the mediastinum. In most instances of œsophageal carcinoma the tumor is of small size and exerts but little outward pressure, and does not extend beyond the outer covering of the tube. There are cases, however, in which these tumors reach considerable dimensions, exercising injurious pressure; and there are other cases in which a direct infiltration of the posterior mediastinum and lungs takes place. Interesting examples of this character have been recorded by Stevens and by Fränkel. Ziemssen, Mackenzie, and others have in particular called attention to œsophageal tumors as a cause of laryngeal palsy by pressure upon the recurrent laryngeal nerves.

CLINICAL MANIFESTATIONS.

The symptoms of mediastinal and other intrathoracic tumors are mainly due to pressure. The same may be said of aneurism, which to all intents is a tumor; but there are differences of a very essential kind in the successive development of the symptoms in the two cases, and careful study of the manifestations, seen from first to last in cases of mediastinal growths, will go far to facilitate accurate diagnosis at any stage of the disease.

First of all, it is to be noted that there are instances of latent intrathoracic tumor in which there are neither distinctive symptoms, if indeed there be any, nor physical signs. Instances of this kind occur in every large series of autopsies. On the other hand, it is usual to find marked symptoms or marked physical signs, or both combined. The classification of these cases from a clinical point of view, which seems to us most likely to be productive of useful results, in rendering the subject clear and diagnosis accurate, is based upon the prominence on the one hand of symptoms, or on the other of physical signs.

We may distinguish three groups, remembering, of course, the fact that mixed cases are apt to occur. These groups are: 1, that in which the anterior mediastinum is the seat of the growth, and in which physical signs are likely to be prominent; 2, that in which the middle and posterior portions of the mediastinum are involved, and in which the symptoms predominate over the physical signs; and, 3, that in which the pleura or superficial portion of the lung is involved, and in which the symptoms and physical signs are of equal prominence. There are, of course, wide variations from any such artificial scheme, and transitional cases are of frequent occurrence.

It is not our present purpose to speak exhaustively of the symptoms of intrathoracic tumors, but rather to sketch the outlines and to illustrate the subject as far as the clinical material that has come under notice will permit.

I. *Intrathoracic Tumors situated in the Anterior Mediastinum.*—Tumors of this situation lie immediately under the sternum, which is frequently pushed forward, and may, in rare instances, be eroded. Physical examination reveals an area of abnormal dulness or flatness to percussion, having a more or less irregular shape. There may be a certain amount of pulsation, but this is rarely marked, and practically never is there a sharp diastolic shock. If the growth extends upward sufficiently far, it may be possible (as in Case I.) to feel an abnormal mass in the depths of the suprasternal fossa. Not rarely these tumors give rise to secondary nodes in the cervical lymphatic glands. Auscultation over the area of dulness may be entirely negative, but in not a few cases the breath-sounds and heart-sounds are well transmitted. The pressure exerted upon the aorta or root of the pulmonary artery may be such that a distinct systolic bruit results.

The symptoms are mainly dependent upon the pressure exerted upon the venous trunks, the superior vena cava, the right and the left innominate veins. These vessels, less resistant than the neighboring arteries, early suffer compression and may be invaded by the growth which penetrates their walls and proliferates within, or there may be complete occlusion by thrombosis. The result of these conditions is distention of the veins of the upper extremities, the head, neck, and upper part of the chest. Coldness, lividity, œdema, and clubbing of the finger-ends result, and the venous channels may be greatly dilated and tortuous. Pressure upon the arteries

is of less importance, on account of the rigidity of their walls, but inequality of the radial pulses has sometimes been observed. The nerves of this portion, and in particular the inferior laryngeal, are often involved. Hoarseness and aphonia are frequent symptoms. A number of cases are recorded in which the sympathetic was compressed, with resulting inequality of the pupils. The trunk of the vagus is less frequently involved than in the cases in which the tumor occupies a plane more posteriorly, or, at least, if this nerve is involved, characteristic symptoms will be wanting, for reasons that will presently be discussed. Not infrequently acute pericarditis or pleurisy with pain and effusion supervenes. When the tumor reaches a large size, dyspnœa is likely to be present, and may be marked; and the same symptom occurs when extension of the growth has taken place posteriorly. The general appearance of the patient furnishes no positive indications; emaciation and anæmia are usually present, but true cachexia is rare. In our experience this absence of cachexia is more frequent in malignant growths of the anterior than of the posterior mediastinum or of the pleura and lungs. Pain may be present and may be decided, but is, on the contrary, frequently absent. In general it is a much less prominent indication than in aneurism.

The following case is one of primary sarcoma of the thymus gland, in which, however, at the stage at which it came under observation extension had taken place to the neighboring lymphatic glands, to the posterior mediastinum, and to the abdominal lymphatic nodes. (See Plate I.) There was also a complicating pleural effusion of dropsical character. The diagnosis was readily made by the distended veins, clubbed fingers, enlarged glands of the neck, the palpable tumor in the suprasternal fossa, and the physical examination of the chest. Unfortunately the history was not obtainable, and the progress of the symptoms could not be ascertained.

Case I.—G. B., a Hungarian lad, aged twenty years, was treated in the wards of the University Hospital during December and January, 1893–94. It was impossible to get from him any intelligible statement of his previous health or of the progress of the illness which brought him to the hospital. He was a miner, and had been at work in the anthracite coal-mines of Eastern Pennsylvania as late as October, 1893. He stated, however, that he had been ill for six months before he entered the hospital, and that he had suffered principally with shortness of breath.

The following notes were recorded at the time of his admission:

Inspection.—The patient presents a remarkable appearance in his features and posture. The eyes are somewhat protruding, the face is puffed, patchy flushing is noted from time to time about the cheeks and chin, and the forehead is covered with large sweat-drops. The neck is swollen, and its circumference just above the clavicles is decidedly greater than that above. The posture habitually assumed is one in which the patient leans forward and to the right, resting his weight on the right elbow. At first sight, he has the appearance of a kyphotic; but there is no curvature of the spine, excepting that the lumbar portion is rather convex than concave. The veins of the neck, upper thoracic region, and lateral portions of the abdomen are greatly distended. The hands are cold and cyanotic; the fingers are club-shaped. The

sternum is prominent above, and the lymphatic glands of the neck project as knobs. The antero-posterior diameter of the body is everywhere greater than the lateral.

Percussion.—The percussion-note over the right lung is hyper-resonant anteriorly and posteriorly. Liver-dulness begins at the sixth rib. The left lung is also hyper-resonant above, but below a line passing through the nipple and angle of the scapula the note is dull. This dulness is movable and evidently due to fluid. In the central part of the chest is found an area of dulness bounded to the right by a line running from clavicle to liver-dulness, one-half inch to the right of the sternum; on the left by a diagonal line extending from the clavicle one-half inch outside the sternum downward to a little beyond the left nipple, then vertically downward to the seventh rib and horizontally over to the liver-dulness. This area is resistant and completely flat on percussion. There is cardiac pulsation somewhat below the usual point and not distinct.

Palpation.—The apex-beat is discernible only as a diffuse or indefinite jogging in the situation indicated. Vocal fremitus is distinct everywhere over the right lung. On the left side it is exaggerated above the mediastinal dulness and the pleural effusion before indicated.

Auscultation.—The breath-sounds on the right side are soft and prolonged, especially the expiration; occasionally sonorous râles accompany the latter. On the left side the breathing is exaggerated, except at the lowest point of pulmonary resonance, where there is distinct bronchial breathing. The heart-sounds are weak and muffled. The second sound is accentuated at both pulmonic and aortic cartilages. There is no murmur. The radial pulses are extremely tense and cord-like, but are compressible. There is no atheroma. The pulse-wave is quite vigorous, and decidedly more so on the left than on the right side.

Examination of the *superficial glands* shows them to be enlarged in various situations. In the neck are found a large number of separately enlarged nodes, but in the lower part of the neck, on the left side, is found one group of glands fused homogeneously. The axillary glands are similarly enlarged, and the epitrochlear very slightly. Deep palpation in the suprasternal fossa reveals a globose mass behind the manubrium. This has the faintest trace, if any, of pulsation. There is no tracheal tugging.

The examination of the *blood* showed 2,930,000 red corpuscles, 9370 leucocytes, and 55 per cent. of hæmoglobin. There were more than the usual percentages of eosinophiles and lymphocytes, and the red corpuscles were quite irregular in size.

Examination of the *urine* showed: specific gravity, 1026; acid; no albumin; no sugar; deposit of amorphous urates.

The *abdomen* was greatly distended by tympany, and on firm palpation there seemed to be an intra-abdominal growth high up. This could, however, not be accurately determined.

On December 27 the note reads: Cardiac impulse to-day is very marked at the xiphoid cartilage. The patient has been growing more uncomfortable, and dyspnœa is increasing.

On January 1 it was noted that the dulness at the lower part of the left chest had increased and was distinctly movable. It was also noticeable that the veins of the chest became distended during expiration and collapsed during inspiration.

On January 11 the feet and legs were very œdematous. Orthopnœa was growing decided. The abdominal walls were distended by tympany and the mass within. The venous net-work on the front of the chest was very pronounced. The arms were livid. The left pulse was distinctly fuller than the right; the pupils were equal and reacted normally to light.

On January 12 distinct leucocytosis was noted, and there were many microcytes and macrocytes, but the exact blood-count was not recorded. The temperature-

chart has unfortunately been lost, but there were frequent slight elevations, and towards the end of life there was almost constantly some degree of fever.

Autopsy.—On opening the thoracic cavity a large tumor was found, occupying mainly the anterior mediastinum. This was somewhat irregularly nodulated and lobulated, and extended over the root of the great vessels and heart, much like a bell or cap. The lower surface was intimately attached to the pericardium, but the inner surface of this membrane was perfectly smooth and not involved in the growth. The mass enveloped all of the great vessels, together with the trachea, and, to a less extent, the œsophagus, the bronchi, and the nerves of the posterior mediastinum. It extended backward on each side over and around the bronchi and vessels at the root of the lung, particularly on the right side, and was continuous with a smaller and somewhat denser growth in the posterior mediastinum, which extended downward to the diaphragm. None of the vessels were completely occluded, but the right innominate vein was greatly compressed. In the posterior mediastinum the œsophagus, aorta, nerves, and veins were all surrounded by the mass. On a closer examination the growth anteriorly was found to contain numerous areas of softening and of cystic formations, the former containing cheesy material, and, in some places, calcareous particles quite abundantly; the latter areas, dark grumous liquid. The left pleural cavity contained a considerable quantity of clear serous liquid, but there was no involvement or inflammation of the pleura itself. The left lung was somewhat compressed and œdematous. The right pleura and lung were normal. The abdomen contained a second and huge growth, which occupied the upper portion of the cavity and was situated for the most part behind the peritoneum surrounding the aorta and its branches, and the vena cava as far down as the iliac branches. The greatest mass of the tumor, however, was above. It extended, also, forward to the root of the mesentery and surrounded some of the coils of intestine. This tumor was lobulated, and presented an appearance like that of greatly enlarged lymphatic glands which had softened and undergone some calcareous deposition.

Microscopical examination of portions of the large mediastinal mass and of fresh nodules on the outer wall of the pericardial sac showed small, round cells with delicate fibrous stroma. The tumor may be regarded as a round-celled or lymphosarcoma.

A second case reported some years ago by one of the writers (Dr. Pepper) was, in all probability, similar to the last, but was marked by the prominent part assumed by complicating inflammation and invasion of the pleura. Points of interest as bearing on the diagnosis were the persistent pain and extreme orthopnœa, with the irregular character of the physical signs, all of which pointed to something more than simple pleural effusion.

Case II. (*Trans. Phila. Path. Society*, vol. vii. page 71.)—The case was under the care of Dr. T. J. Yarrow, with whom Dr. Pepper saw it in consultation. The patient was an active business-man, aged fifty-six years. There was no predisposition to cancer. He had been subject to a bronchial cough for years. In May, 1876, he had an attack of acute malarial fever of short duration. A month later he came under observation with a marked effusion of the right pleural sac which caused violent orthopnœa. There were localized chest pain, absence of respiratory murmur, and dulness on the right side. These signs gradually diminished, and after a month he was much improved. During this period, also, there were heavy coating of the tongue, torpid bowels, and scanty urine. After he began to go out there was a return of the effusion and dangerous orthopnœa; this was in September. Distinct prominences, with severe pain, were now first noted. The earliest prominence to appear was over the ninth rib of the right side, four inches from the spine. The

second was below the sternal end of the right clavicle; the third on the right side, in the line of the armpit, about the tenth rib. The signs of the second pleural effusion never entirely disappeared, and there was no subsidence of the pain.

Early in October the following conditions were noted: There was great emaciation but no cachexia, though there was great pallor. There was profuse sweating at irregular periods, and sometimes so profuse as to require several changes of clothing. Sleep was disturbed by continuous and progressively increasing pain, which was specially marked over the prominences, and also along the nerves of the right arm. There was a severe, dry cough. The right chest was enlarged, and the heart was displaced towards the left side. Irregular dulness was discovered by percussion of the right side. At the apex anteriorly the note was dull; posteriorly there was complete flatness. The lower part of the lung anteriorly was resonant. There was no change in the distribution of dulness when the patient changed his position. Faint and distant bronchial breathing was heard posteriorly; over the resonant area in front the respiratory murmur was normal. There was no distention of the veins of the face, neck, or right arm. The prominences increased in size. The effusion did not largely reaccumulate after a second aspiration. Great loss of flesh and strength, with severe cough, and excessive pain preceded death.

At the *autopsy* a large mass resembling an encephaloid sarcoma was found in the anterior mediastinum. This was attached to the sternum and also to the outside of the pericardium. The heart was displaced towards the left. The pericardium showed evidence of an old pericarditis. On the right side, corresponding with the prominences already described, were extensive cancerous masses. In the case of the one over the apex in front, the morbid growth also involved the intercostal tissues and the second and third ribs. The mass on the posterior surface was very large and very extensive, and involved both layers of the pleura, and also the superficial layer of lung-tissue at a few points. It reached from about the third rib down to near the diaphragm, and was fully one inch thick in some places. The mass low down on the side was smaller, also involved both layers of the pleura, and was continuous with a large growth which involved the whole thickness of the diaphragm. The anterior part of this muscle was chiefly affected; the growth in places was fully one-half to two inches in thickness, and the disease extended across to the median line, where it was continuous with the mediastinal growth before described. At one spot over the convexity of the liver there was an extension of cancerous disease to the capsule and superficial layer of the tissue of that organ. There was no pleural effusion. The lung itself contained but a few cancerous nodules, and was for the most part wholly crepitant excepting the apex and posterior parts, which were œdematous. The liver was enlarged and congested; the other organs were healthy.

The microscopical examination was not made, but there can be little doubt that this was an instance of sarcoma of the thymus, with secondary extensions.

II. *Intrathoracic tumors situated in the middle and posterior portions of the space* around the bronchi, œsophagus, aorta, and nerves of these regions are particularly apt to produce marked symptoms, even before the tumor has reached large size. We have seen an aneurism no larger than a pigeon's egg cause the most violent dyspnœa possible, and cases of pronounced symptoms due to tuberculous peribronchial glands in children are not unusual; but our experience has not included a case where a tumor of small size has acted in this way. It does occur at times, however. The most decided symptom, as a rule, of tumors in this situation is dyspnœa, which

may increase to highest grade of orthopnœa. The inspiration is often painfully labored and stridulent; recession of the supraclavicular and suprasternal fossæ and of the base of the chest is often marked. Cough is usually present and may vary widely in character. Sometimes it is loud and ringing; at other times constant and hacking. The sputa are muco-purulent as a rule, but not rarely are blood-stained, particularly when penetration of the bronchial wall has occurred; and even particles of the tumor may be expectorated. When the vagus is compressed or involved there is a peculiarly paroxysmal form of cough, often with a whooping quality, and attended at times with paroxysms of dyspnœa as well. This may occur where but one vagus is involved, though experimentally both must be cut to produce analogous symptoms. Sir William Gull explained this by showing that in case of only one of the nerves being cut the impulses travelled to the opposite side through the pulmonary plexus, whose anastomosis is very free. In case of tumors, however, the pulmonary plexus is apt to be coincidently involved, and disease of but one nerve is necessary to cause the symptoms. This explanation serves to show also why the symptoms indicated are more common in cases of involvement of the vagus in the posterior mediastinum than when it is implicated in a mass high up in the anterior mediastinum and neck. The same disease of the vagus is invoked to explain the attacks of vomiting, and the seizures of cardiac palpitation, irregularity, or syncope at times observed. Pressure upon the azygos veins may occasion œdema of the upper part of the abdomen and serous effusions of the chest; not rarely pleural effusions are due to complicating inflammation or neoplasm of the pleura.

Tumors of the posterior mediastinum more commonly cause rapid emaciation, and partial, if not typical, cachexia. This may be due to the greater intensity of the symptoms, the greater frequency of involvement and destruction, by pressure-necrosis or ulceration, of the lung-substance; and sometimes in particular to pressure upon the œsophagus and thoracic duct. Dysphagia is a pronounced symptom in some instances, and may for a long time be the only one, though this is unusual. Deep-seated pain is sometimes complained of, and in rare instances darting neuralgic pains radiate along the nerves.

Fever is more likely to occur in growths of the posterior mediastinum than in those of the anterior. Bennett first drew attention prominently to this as a symptom of glandular tumors of the chest, but elevations of the temperature may occur in any case. Usually the elevations are slight, but where there is considerable pressure upon the bronchus and lung, and particularly in cases of ulcerative carcinoma, high and irregular fever and marked sweating have been noted. Where the circulation is greatly impeded, and this applies with peculiar force to anterior mediastinal tumors, depression of the body-temperature has often been observed.

The following case illustrates very well the symptoms in a case of tumor of the posterior mediastinum of moderate size. One peculiarity of note

was the dulness on percussion over the left lung anteriorly. There was neither pleural effusion nor involvement of the tissues in that situation by new growth to explain the physical sign; and in all probability it depended upon alteration of the intravesicular tension due to compression of the left bronchus.

Case III.—M. K., aged seventy-five years, was admitted to the medical ward, presenting the following conditions: She was much emaciated and of an extremely anæmic appearance. The striking and practically the only symptoms were extreme dyspnœa and restlessness. The patient lay on the side, but moved continuously from the one side to the other. Physical examination revealed marked dulness over the anterior part of the left chest, with diminished respiration. There was a systolic cardiac murmur and apparently hypertrophy of the heart. There was no particular change in the symptoms, and the patient soon expired.

Autopsy.—The pericardial and pleural sacs were normal; the heart was enlarged. At the root of the left lung was found a mass of solid tissue, pressing upon and enveloping the left bronchus. This mass was continuous with a similar new growth enveloping the trachea and other structures of the posterior mediastinum. On section, the tumor was found to be composed of a mass of altered lymphatic glands; it was of a gelatinous appearance, and exuded a viscid, milky liquid. Numerous small nodules were found in the pericardium and pleura of the left lung adjacent to the tumor. Microscopic section showed this to be a lympho-sarcoma.

The next case was one of secondary cancer of the glands of the posterior mediastinum in which the symptoms and physical signs were scarce marked enough to warrant a diagnosis, and, indeed, this had not been made. The dyspnœa did become quite extreme immediately before death, but there was a high grade of cachexia and asthenia, and there was neither any stridor nor any definite physical sign of tumor.

Case IV.—X. Y., an old lady, under observation with symptoms pointing to cancer of the stomach, was noticed to become more and more dyspnœic and to have more or less cough. Physical examination failed to reveal any condition of the heart or the lungs likely to produce these symptoms, but it was remarked that the respiratory murmur was decidedly lessened. This was as marked on one side as the other. She was emaciated to an extreme degree, and soon died of exhaustion. At the autopsy a large pyloric carcinoma with dilatation of the stomach was discovered, and there was a mass of enlarged lymphatic glands the size of a large apple in the posterior mediastinum at the roots of the lungs. The bronchi were pressed upon, but not seriously; and there was no involvement of other structures. Microscopic examination of the gastric tumor and of the mediastinal glands confirmed the diagnosis of carcinoma.

In the following case the tumor had evidently begun in the posterior mediastinum, but at the time it came under observation the symptoms of a complicating pleural involvement and of pleuritic effusion were even more pronounced than those of the original mediastinal disease. (See Plates II. and III.) Definite aid was rendered in the diagnosis of this case by the swelling of one of the ribs, and by the removal through aspiration of

intensely hemorrhagic liquid. The case was seen in consultation with Dr. J. L. Forwood, of Chester:

Case V.—Mr. D., aged fifty-four years, had been a good liver. There was no specific history. His illness began insidiously about seven months before he came under observation, and developed progressively. The main symptoms were progressive dyspnœa, increased by exertion; cough of a somewhat paroxysmal character; and later intense pain referred to the side and upper part of the left chest. The sputa were sometimes bloody. Emaciation was moderate, but there was marked pallor, though no distinct cachexia. The temperature was little if at all elevated. There was little sweating. Towards the close of his life the position of greatest comfort was sitting upright and leaning well forward. A painful swelling of the fourth left rib in the axillary line appeared about two months before death.

Physical examination, shortly before death, showed marked impairment of expansion of the upper part of the left chest. The heart was somewhat but not greatly displaced, and was apparently normal. The enlargement of the rib was visible and palpable, and was the seat of pain and tenderness. It seemed firm to the touch. Over the upper lobe of the lung, both front and back, there was great decrease of the vocal fremitus and resonance, with absolute flatness on percussion, and an extremely weak respiratory murmur. Over the lower lobe of the lung the percussion was full and the breath-sounds were almost normal. The right lung seemed entirely normal. There were no physical signs pointing to aneurism.

Exploratory puncture of the upper part of the left pleural sac was performed, and marked hemorrhagic fluid was withdrawn. This was submitted to microscopic examination, but no distinctive elements were discovered. Death occurred soon after this time.

The *autopsy* was performed the day after death. The swelling and bulging of the fourth rib were still quite apparent. On opening the thoracic cavity there was found a considerable quantity of bloody liquid in the upper part of the left pleural sac. The lung itself was pressed downward and against the chest wall. It was soft and œdematous, and was easily torn by the fingers in the attempt to remove it. Opposite the external swelling alluded to there was a mass of tumor-tissue which had involved the rib and invaded the pleura and lung within. The rib itself was somewhat eroded and brittle. The tissues of the chest wall were considerably infiltrated as far outward as the superficial muscles and for an inch or more around the point of greatest bulging. The lungs were removed together, and with the heart attached. There was then discovered a mass of tumor situated at the root of the left lung and extending around the descending aorta, trachea, and other structures of the posterior mediastinum. In particular, however, this tumor invaded the substance of the left lung as a dense white mass, marked in numerous places by darkly pigmented lymphatic glands. Many of the latter were involved in the disease, but some were apparently healthy and merely surrounded by the growth. The edge of the tumor where it merged into the lung-tissue was rather sharply defined, but did not show any evidence of the formation of a capsule. The lung-substance was so compressed and œdematous as to present the appearance of a pulpy mass. Posteriorly and laterally the mass approached the surface and involved the pleura; and it was in this way that the attachment to the fourth rib and its involvement had taken place. Some of the glands at the root of the right lung were involved, but there was no extension of the disease into the lung-substance. The outer surface of the pericardium was involved, but within the membrane was healthy. The heart and other organs were not invaded. A large calculus was found in the pelvis of the left kidney, also a quantity of gravel.

The tumor, though it surrounded the bronchus of the left lung, the trachea, and

to a large extent the aorta, did not cause serious compression of any of these structures.

Microscopic examination of the growth showed it to be a lympho-sarcoma.

In the next case, though the autopsy revealed involvement of both the anterior and posterior mediastinal spaces, the earliest symptoms referred to the latter, and throughout the case the prominence of these symptoms and the absence of physical signs indicative of tumor of the anterior mediastinum leave little doubt that the origin was in the posterior space. The specimens in this case have unfortunately been lost, and there must remain a certain amount of doubt as to the exact point of origin, if not of the nature of the tumor itself. The Committee on Morbid Growths of the Philadelphia Pathological Society reported that the tumor was carcinoma. There are facts, however, even disregarding our present knowledge of the greater rarity of carcinoma, which would incline us to the view that this was a case of sarcoma after all. The latter form of new growth is certainly more apt to occasion "disease of the glands in both the anterior and posterior mediastinum, forming masses of considerable size." Carcinomatous tumors are more likely also to undergo degeneration or ulceration and neurotic breaking down of surrounding structures than was the case in this instance. If this was indeed a cancer, the point of origin was probably either the œsophagus or the root of the right bronchus. Against the latter view, and we might say, at the same time, against the view of the cancerous nature of the disease, was the fact that the right bronchus was merely compressed and not penetrated; the œsophagus is said to have been "embedded." We are strongly of the opinion, therefore, that the case was one of sarcoma of the glands of the posterior mediastinum in the first instance, following which more general glandular involvement occurred.

Case VI. (*Trans. of the Path. Society of Phila.*, 1878–79, vol. ix. p. 171.)—The patient, a blacksmith, aged forty years, was admitted to the Philadelphia Hospital presenting the signs of a large pleural effusion on the left side, extreme dyspnœa, husky, whispering voice, and slight dysphagia. The history was obscure, though it appeared that for two years there had been occasional dysphagia and increasing huskiness of voice; and that for three months there had been increasing dyspnœa. On examination the physical signs of pressure on the right bronchus were detected, and some enlarged and hard lymphatic nodes were found in the left supraclavicular space. The diagnosis was made of primary cancer of the intrathoracic glands pressing on the right bronchus, œsophagus, trachea, and azygos vein. Death occurred suddenly from collapse. The autopsy revealed cancerous disease of the glands in both the anterior and posterior mediastinum, forming masses of considerable size. The right bronchus was compressed. The œsophagus and descending aorta were partly embedded in the cancerous growth. The azygos and hemiazygos veins were involved, and so embedded that it was impossible to dissect them out. A large pleural effusion existed on the left side.

The Committee on Morbid Growths, to whom the specimen was referred, reported: "The specimen . . . is found, by microscopic examination, to consist of fibrous-tissue stroma arranged so as to form alveolar spaces, in which spaces are seen

epithelial cells. This arrangement of structure is characteristic of carcinoma,—variety scirrhous. The enlarged glands from the neck have undergone a similar metamorphosis, as shown by microscopic examination."

III. *Tumors originating in the Pleura and Lung.*—The third place of importance from which intrathoracic tumors are found to spring is the pleura. In very many of these there is soon a certain amount of involvement of the underlying lung-structure, and, indeed, it is quite likely that in some instances the growth, though seemingly pleural in origin, first involves the subpleural tissues.

The symptoms in these cases may be exceedingly puzzling. In a great majority of cases the first diagnosis is pleurisy. This is justified by the apparently sudden onset of many cases, the sharp pains in the side, cough, the development of dyspnœa, and the detection later of signs of effusion. There are, however, marked differences even in these symptoms in malignant disease and simple inflammation of the pleura. In the former the pain is generally much sharper and less dependent upon the movements of the chest, and it shows less tendency to abate. In addition, radiating pains are often found to traverse the intercostal nerves or the nerves of the neck and arms. The cough is more persistent and more irritating, and if the lung has become involved bloody sputa may be expectorated. In some cases the diagnosis has been positively established by the detection of characteristic cells or groups of cells in the sputa. This has naturally been more frequent where the lung was primarily diseased than where the pleura was the place of first involvement. Many observers have found particles of cancerous tissue, and several were enabled to diagnosticate the less ulcerative sarcoma (Huber, Hampeln, Kroenig, Eichhorst). Hairs have been found in the expectoration in dermoid cysts, and hooklets in cases of hydatid disease.

When pleural effusion is present the difficulty of diagnosis may be even greater than before. It is noticeable, however, that in many cases the physical signs are very irregular and sacculation of the effusion is frequently present; or without distinct sacculation it may be noted that the physical signs do not change with changes in the position of the patient. Finally, exploratory puncture is of the greatest service. The liquid thus obtained is almost always hemorrhagic, more so, as a rule, than in any other form of pleural disease. Microscopically, it has been shown by several observers that there is an excess of fatty matter in the form of oil-drops; the liquid may indeed be decidedly chyliform. This fatty character was claimed for cancer alone by Quincke and Boegehold; but Fränkel saw it in a case of sarcoma. The last-named observer insists also on the diagnostic value of certain large, swollen cells, which he maintains are merely altered endothelium, but which seem to become detached and transformed in this manner only in cases of pleuritic disease of malignant character. Altogether, aside from this question of the character of liquid withdrawn, important information is not rarely given in the operation itself by the resistance offered to

the trocar. Twice our suspicions have been confirmed in this way in malignant disease of the pleura.

The general appearance of the patient is, as a rule, quite different from that of a person suffering with ordinary or even tubercular pleurisy. Rapid emaciation and extreme anæmia are frequent, and cachexia, though not so frequent as we might expect, is occasionally noted.

When secondary growths are deposited the diagnosis becomes almost certain. If the lung is involved, as in one of our cases, extreme dyspnœa and cough are noted, and the physical signs may give important aid. When the pleura is involved near the apex, primarily or secondarily, hoarseness and other signs of implication of the recurrent laryngeal nerve are of frequent occurrence; and, finally, the nature of the disease can scarcely be in doubt when, as so frequently occurs, the ribs are invaded or bulged by large masses within.

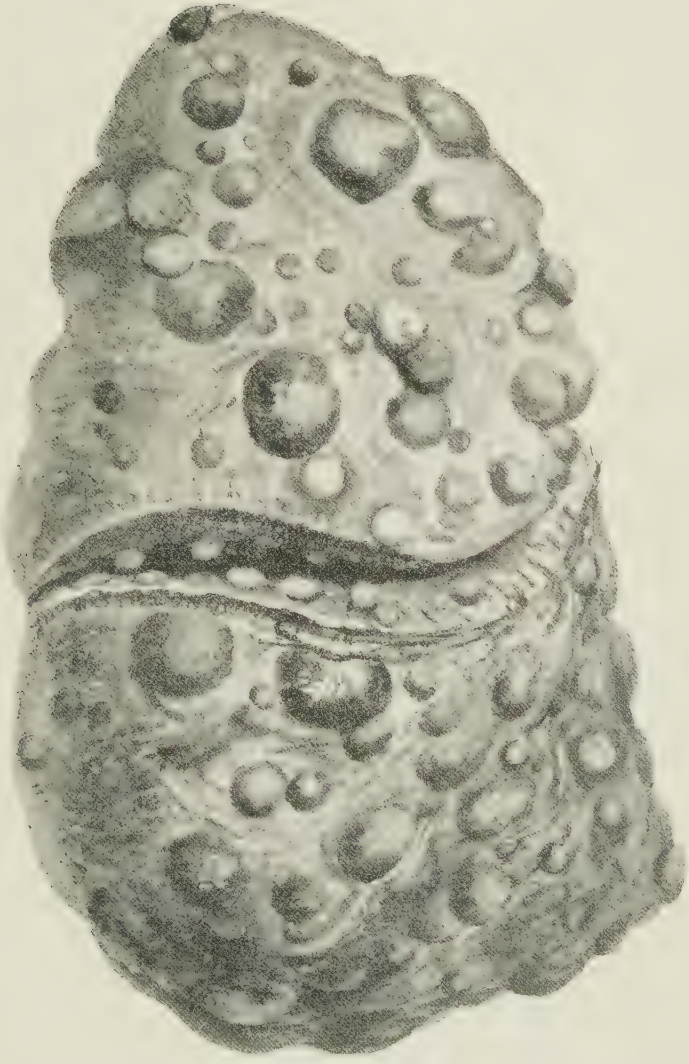
We proceed now to detail the three cases of our series in which the pleura was primarily involved. In two of them we confess there must remain a reasonable doubt as to whether or not there was involvement, first of all, of the subpleural pulmonary tissue in the one, and of the periosteum of the rib in the other. Our own opinion is in favor of the pleural origin, but we shall recur again to this after detailing the cases in question:

Case VII.—E. J. B., aged seven years, came under observation in May of 1894. He lived in a distant part of the city, and was placed under the care of Dr. Moylan, to whom we are indebted for the clinical notes. His previous health had been entirely good, but for several months previous to May, while attending school, he began to ail. Later he complained of severe pain in the left side near the lower border of the ribs in front. His attendant at that time diagnosticated pleurisy, and evidently thought lightly of it, as the patient was permitted to continue at school. The pain was always aggravated by gastric derangement, particularly by flatulency, and the child continued to lose flesh and strength, so that the father was obliged to take him from school. He was sent to the sea-shore, but did not recuperate. When he first came under notice, in the middle of May, the child was highly emaciated. On physical examination the apex-beat was seen to be displaced almost to the right axillary line. The left intercostal spaces bulged, and there was almost complete absence of the respiratory murmur, with flatness on percussion from about the third rib downward. There was no fever. He had no appetite; and severe paroxysms of pain in the left side and loss of sleep aided in reducing his vitality. There was practically no cough or expectoration.

The child was put to bed and carefully fed. Heart-tonics were administered, and after a few days an exploratory puncture was made with negative results. Sarcoma of the lung and pleura was now diagnosticated by exclusion, but a resection of the rib was performed, and the diagnosis was completely confirmed. The operation was performed in the hope that it might prove otherwise. The child's condition deteriorated steadily, and he died a few days later.

At the *autopsy* there was found a rather circumscribed, whitish, soft tumor of the antero-lateral portion of the base of the left lung. This was about the size of a small orange; in places it seemed almost encapsulated, but in front was firmly attached to the sixth rib, and invasion of the intercostal tissues had occurred. Above and inward, the lung bordering on the tumor was highly œdematous, compressed, and pulpy. There was some slight infiltration from the growth. The upper part of the

PLATE IV.



Left lung of case of primary sarcoma of right pleura with secondary involvement of both lungs.

pleural cavity contained a small amount of bloody fluid. All of the other organs were normal.

The microscopic examination showed the growth to be a mixed sarcoma. Most of the cells were small and round, but some were spindle-shaped or irregular.

As to the origin of this growth, we admit there is some doubt. In places it seemed to be covered by pleura, and this appearance suggested the form of subpleural sarcoma referred to by Coats and others; but the centre of involvement seemed on the whole rather to be the pleura itself, with extension inward to the lung on the one hand, and outward to the periosteum of the rib and to the intercostal tissues on the other.

The case is of interest also from the early age of the patient. This is not an unusual feature of intrathoracic tumors, however, as will be seen from the fact that Edwards has tabulated some thirty-seven cases in his article in Keating's "Cyclopædia of Diseases of Children," and from our own experience. We report in this series three cases, in which the ages were respectively seven, thirteen, and twenty years, and have seen several others in the service of colleagues and in consultation practice. Of course, the number becomes very considerable if we include cases of tuberculous disease of the glands of the chest.

The next case was not seen during life by either of us, but through the kindness of Dr. Thomas P. Tyson, of Jenkintown, one of us was permitted to make the post-mortem examination, and we are indebted to him also for the clinical notes (see Plate IV.):

Case VIII.—J. McC., a lad, aged thirteen years, had been ill for several months before his death. He had complained of great loss of strength, and had a persistent cough, with more or less shortness of breath, but with little expectoration. In addition he suffered much pain in the right chest, especially in the upper part. The illness seemed to follow directly upon an injury of the upper part of the right chest, in the situation indicated by the pain. Previous to the time of this injury the boy had been healthy, but smoked cigarettes immoderately. The cough was most persistent and sometimes distinctly paroxysmal; towards the end it was accompanied by more expectoration, the sputa being muco-purulent in nature. He became very much emaciated at last, but never presented a distinctly cachectic appearance. There was from the first considerable perversion of appetite. Physical examination revealed a swelling or bulging of the second rib of the right side at about the anterior axillary line and engorgement of the veins of the neck. There was decided dulness on percussion over the upper part of the lung, with absence of breath-sounds. Below the lung was resonant, and moist râles and crepitation were discovered, accompanying harsh respiratory sounds. Percussion-resonance on the left side was full until shortly before death, and mucous râles were constantly present. These symptoms and physical signs continued with but little change until the boy's death, but the dyspnœa, later orthopnœa, and emaciation steadily increased. The temperature ranged from the normal to 101° F., and the pulse from the first was rapid,—110 to 120 per minute. The swelling of the rib and the persistent cough and dyspnœa led Dr. Tyson to diagnosticate sarcoma of the lung, and in this opinion he was supported by two consultants.

The *autopsy* was performed by one of the writers (S.). The external appearances were the same as above described. On opening the thoracic cavity there was

found a considerable quantity of pleural effusion of serous nature in both sides. Attached to and involving the third rib of the right side and invading the lung was a hard, white tumor the size of a middle-sized orange. This was irregular in shape, and bound the lung firmly to the chest wall. There was no attempt at encapsulation. The rib was involved on the inner surface alone, but was thinned and pushed outward by the tumor. Both lungs were densely studded with secondary nodes, varying in size from that of a marble to that of a plum. These were encapsulated and for the most part quite soft. A number of the larger were quite pulpy. All parts of both lungs were involved. No other organ appeared in any way abnormal.

Microscopic examination showed the tumor to be a round-celled sarcoma.

The injury sustained and the close involvement of the periosteum of the rib in this case allow the suspicion that in reality this was the point of origin. The pleura and adjacent lung were, however, more decidedly involved, and the appearance of the specimen suggested outward extension. In addition, it is more likely that a round-celled sarcoma would spring from the pleura than from the periosteum, though the latter situation is sometimes the seat of this form of new growth.

Finally, we would record a case of unquestionably primary pleural disease of the variety called endothelioma, to the pathological features of which we have already made allusion (see Plate V.). This case did not come under our personal observation, but one of the writers made the autopsy. Our thanks are due to Dr. Alfred Hand for the clinical notes:

Case IX.—H. S., a German clothier, aged thirty-eight years, was admitted to the German Hospital under the care of Dr. Adam Trau, April 15, 1893. Little was learned regarding his family history, except that one brother died of phthisis.

He had typhoid fever when thirteen years old, but, with the exception of an attack of malaria in 1881, he remained healthy until about eight months before his entrance into the hospital. About that time he began to suffer with pains in the back and a cough. He was not confined to bed, and did not consult a physician. The cough was attended with little expectoration. Physical examination at the time of his admission to the hospital showed the following: The apex-beat of the heart was displaced to the right of the sternum. The right lung was clear. On the left side there was flatness on percussion, absence of fremitus and of the breath-sounds from the base as high as the third rib. Above this there were bronchial breathing and an almost tympanitic percussion-note. For some time after he came under observation severe pain was felt in the region of the left shoulder. There was no elevation of the temperature, and the patient was pallid, though not cachectic.

On *May* 2 seventy-four ounces of blood-stained serum were drawn off. A half-drachm of this was injected beneath the skin of a rabbit, causing an abscess and death in four weeks, with no other discoverable lesion. Pus from the abscess was examined for tubercle bacilli, with negative result.

May 3.—There was little change in the physical signs following the aspiration.

May 20.—Eighty ounces of grumous blood and serum were withdrawn. Some of this was injected into the peritoneal cavity of a rabbit, and death occurred a month later. Nothing, excepting some coccidial nodules in the liver, was discovered.

May 24.—The pleural cavity was again filled with fluid, and a drainage-tube was inserted.

June 27.—The case was now transferred to Dr. G. G. Davis, and a rib was resected. Following this the patient's condition grew steadily worse. Violent cough, with

PLATE V.

Endothelioma of left pleura with secondary invasion of the lung. The illustration shows the left lung and pleura laid open by an incision from the apex to the base and from the periphery toward the root of the lung. The pleura is seen to be greatly thickened, especially the diaphragmatic reflection; the lung is compressed and invaded; the pleural cavity is kept open by the rigid walls, and small nodules are visible on the surface of the pulmonary reflection.

slight expectoration, progressive emaciation, and continuously afebrile temperature preceded death, which occurred on July 26.

Autopsy.—The body was wasted to the last degree. In removing the superficial tissues it was found that the left pectoral muscles and the overlying skin were tightly bound together and to the chest wall, and were infiltrated with white nodules. There was some pericardial effusion. The heart was pushed so far to the right that its centre lay under the right border of the sternum. There was a large effusion in the right pleural sac, with strong pleural adhesions. On the left side the pleura was enormously thickened, the costal reflection being in places quite an inch in thickness.

The visceral pleura was almost equally thickened and was everywhere firmly attached to the compressed left lung. The lung itself was infiltrated with numerous whitish-yellow nodules. These were more densely placed near the surface; most sparsely within. The left pleural cavity was distended with liquid similar to that obtained by aspiration. The pleura was very hard and of a glistening whiteness; the inner surface was in some places somewhat irregularly elevated and soft, but this was not the usual condition. For the most part the inner lining was smooth.

The right lung was filled with white nodules. A small nodule was found in the left suprarenal capsule and another in the right kidney; the other organs were unaffected.

The first impression conveyed by the appearance of the pleura was that of chronic inflammatory thickening. Nowhere in this membrane was there a distinct suggestion of nodular or tumorous disease, and only microscopic examination could have revealed the nature of the case. The secondary implication of the lungs, however, showed even to naked-eye examination that there was something more than pleurisy, and the involvement of the chest walls left little doubt that this was of the nature of a new growth. The microscopic examination revealed long columns of cells with more or less perfectly developed or preserved lumina (see Plate VI.). The cells composing these columns were large and of epithelioid character. In many places, as the illustration shows, there was a decided cylindrical character of the limiting cells, while those within presented irregular shapes. The nodules within the lung were similar in appearance, though the acini were not so much elongated. There could be no doubt at all in this case that the pleura was first involved, as the invasion of the right lung was unquestionably secondary, the pleura not being involved at all on that side, and the appearance of the left lung being exactly the same except that the nodules near the periphery merged into the diseased pleura.

Enough has been said regarding the nature of this growth before. It is best designated by the term endothelioma, and we would include it in the group of sarcomata.

DIAGNOSIS.

We may, in conclusion, say a few words regarding the distinctions which may be established between tumors of the mediastinum and aneurism. Essentially, as we said almost at the beginning of this paper, the symptoms are dependent upon the same cause,—viz., pressure; but a careful study of the progress of the symptoms will prove of the greatest service in establishing the diagnosis. Mediastinal tumors are generally infiltrating,

non-capsulated growths which extend in the direction of least resistance, and which, therefore, give rise to much less regular symptoms. Pain is less common and erosion of the bony structures far less frequent. The patient is generally younger than patients with intrathoracic aneurism, and there is usually in the latter some evidence of general arterial disease. Anæmia and emaciation are more pronounced in tumor. Fever is occasionally noted in aneurism, especially when deep-seated, and it may be marked, as in Gairdner's case and in some of our own; but, on the whole, new growths are far more commonly attended with elevations of the temperature. A distinction of the very greatest value in diagnosis is the tendency on the part of intrathoracic tumors, particularly those of the anterior mediastinum, to cause early occlusion of the large veins, giving rise to enlargement of the superficial veins and other signs of venous engorgement. The same thing may occur in aneurism, in the later stages, but even then is infrequent. In the physical examination we are struck by the greater irregularity of the signs in case of tumor. The area of dulness is more irregular; pulsation is less vigorous and almost always distinctly weaker than the pulsation of the heart; the diastolic shock of aneurism is wanting. The auscultatory signs are usually quite different: in tumor there is rarely a systolic bruit, and the second heart-sound does not have the same accentuation as in aneurism. Tracheal tugging is a sign of doubtful value, but is more common in aneurism. Deep-seated tumors and aneurisms are more difficult to distinguish. Pain, however, is less decided in the former, while dyspnœa, stridor, fever, and emaciation are more pronounced. Complicating pleural or pericardial disease would aid powerfully in the diagnosis of the case, as they are far more frequent in cases of tumor.

RÉSUMÉ.

Some of the most important points to which we would again allude are the following:

(1) The most frequent intrathoracic tumor is sarcoma.

(2) The most frequent point of origin is the anterior mediastinum, and in particular the remnant of the thymus gland.

(3) Clinically, these growths may be grouped as those affecting the anterior mediastinum in which physical signs are prominent, those of the middle and posterior mediastinum in which the symptoms predominate over the physical signs, and those beginning in the pleura and in which both symptoms and physical signs are pronounced from the first.

(4) In the diagnosis the important requisite is a careful consideration of the history of the case from the very beginning, with special attention to the progressive development of the symptoms and physical signs.

PLATE VI.

Microscopic section from case of endothelioma of the pleura.

THE GEOGRAPHICAL DISTRIBUTION OF THE MINERAL SPRINGS OF THE UNITED STATES.[1]

BY A. C. PEALE, M.D.,

Washington, D. C.

"WATER cures gout and hypochondriac melancholy; it benefits gravel and stone in the bladder; it makes the child grow strong in the womb, and increases the mother's milk; it stays hunger, for there was a certain crack-brained man who, at Leyden, when Dr. Carr resided in that university, pretended he could fast as long as Christ did, and it was found that he held out the term of forty days without eating any food, only he drank water and smoked tobacco." "Water is also of great use to strengthen weak children; it prevents swelling from bruises, sickness of the stomach, shortness of breath, and vomiting; it cures fluxes, consumption, flushes, colic, small-pox, etc."

This, gentlemen, is not a quotation from one of our modern mineral spring circulars, but an extract from a work nearly two hundred years old, entitled "The Curiosities of Common Water, or the Advantages thereof in Curing Cholera, Intemperance, and other Maladies," by John Smith, C.M. It was reprinted at Boston, Massachusetts, from the London edition of 1712, for Joseph Edwards, at the corner shop on the north side of Town House, in 1725.

Had a map of our mineral springs been prepared when this was written, or when it was republished at Boston, the High Rock Spring of Saratoga, some of the springs at Ballston, New York, the Warm Springs of Virginia, the Sweet Springs of the same State, the Greenbrier White Sulphur Springs, and Berkeley Springs, then called Bath, might have been cited, although none of them was at all improved or used as a resort until the time of the Revolution, or later. Had the map been made in 1831, after Dr. John Bell published his "Baths and Mineral Waters," the springs named above would not be so few in number, for some fifteen other springs would probably have been added to the number, but nearly all of these would have been in the Appalachian region, mainly in Virginia, New York, and Pennsylvania, with a few in North Carolina and Kentucky, and one in Arkansas,—the celebrated Hot Springs, then known as Washetaw Springs. If we have not made any striking advance in the claims of our mineral water literature, as shown in most of the mineral spring circulars of to-day, we have certainly advanced in the knowledge of the location of our min-

[1] Read at the meeting of the American Climatological Association, at Hot Springs, Virginia, June 14, 1895.

eral springs. I have recently compiled for the United States Geological Survey two maps, one showing the distribution of some three hundred and thirty springs, whose waters are put upon the market to the amount of more than twenty million gallons annually, with a valuation between four and five millions of dollars. Upon the other map I have plotted nearly seven hundred mineral springs which have become resorts.

The map of those springs whose waters are used commercially shows at the first glance that the majority of such springs are found in the Eastern United States and in the Mississippi Valley. West of the one hundred and first meridian they are largely confined to the Pacific coast. In Idaho, Colorado, New Mexico, and Montana we find, altogether, barely a dozen springs so used. This is not because the total number of springs in the East is so much greater than in the West, but it is mainly because the former region has the greater population, and consequently that which is true in many other respects is also true in the matter of mineral waters,—that its resources in that direction are more thoroughly developed and utilized than is the case in the West.

The map of the "Mineral Springs Resorts" presents a much larger total number of springs, and shows also a more equable distribution over the country, for many of our most improved and best known resorts are found in the middle West and in the Rocky Mountain region, and in no respect do they suffer in comparison with those in the East or with those on the Pacific coast. Thus a map giving all the springs would have some plotted within the borders of every State.

Another glance at the map would show that our thermal springs lie mainly in the West. The States west of the one hundred and first meridian include a little more than thirty-nine per cent. of the total area of the country, and yet they contain more than eighty per cent. of its known thermal springs.

The thermal quality of a spring depends largely upon its geological position. Professor W. B. Rogers pointed out many years ago the connection between the warm springs of Virginia and the faults and anticlinal axes of the Appalachian Mountains. In almost every country a connection between thermal springs and mountain ranges is readily recognized, and just as apparent is the connection, the world over, between hot or warm springs and the occurrence of volcanic rocks. In the Rocky Mountain region and other parts of the far West, in addition to the mountainous character of the country, which is of recent origin compared with the Appalachian section, we have also a region of more recent volcanic disturbance, and one in which rocks of igneous or eruptive origin frequently cover extensive areas. As already stated, the hot and warm springs of Virginia and the warm springs of North Carolina and Georgia are found within the limits of the Appalachian folds, and the Arkansas hot springs are found in connection with the Ozark Mountain uplift.

Inasmuch as mineral waters derive their solid constituents from the

rocks through which they pass on their way down and up before they emerge as springs, in this respect also they must be very dependent upon the geological structure of the country. With this in mind, a comparison of the geological map of the United States with a map of its mineral springs is very instructive. In regions where the older or metamorphic rocks constitute the surface formation, or are near to it, as a rule the waters contain a much smaller percentage of mineral matter than in those regions where, in order to reach the surface, the water must pass through sedimentary rocks, which, on account of their structure, are more readily affected by the solvent powers of the water.

It has frequently been stated that thermal waters are less highly mineralized than non-thermal waters. *A priori*, hot water is a better solvent than cold water; therefore if sometimes a thermal water is less highly mineralized, it is probably because it comes from a greater depth, where the rocks are of such a character as to be less readily acted upon. Other things being equal, there is no reason why a thermal water should not contain the same ingredients as a non-thermal water; and, as a matter of fact, where the two occur in the same locality, coming through the same rocks, the difference in quantity is in favor of the thermal water. Here in Virginia, for instance, at the Hot Springs, one of the springs, with a temperature of 78° F., has 18.09 grains per gallon of solid contents, while another, with a temperature of 110° F., has 33.36 grains per gallon; and at the California geysers the coldest spring, with a temperature of 70° F., has 7.12 grains per gallon, and the hottest, at 212° F., contains 296.4 grains per gallon.

So far as the general geological features of the North Atlantic States, including those from Maine to Pennsylvania, are concerned they might be divided into the sections so long recognized in our older school geographies, —viz., the New England and the Middle States. In the former the older rocks form a large part of the surface, which accounts for the fact that, as a rule, the mineral springs of that section are somewhat less highly mineralized than are those of the Middle States. The springs of Maine are slightly alkaline-saline and chalybeate. In Vermont the conditions are much the same, except that sulphuretted springs are more numerous. Connecticut, Rhode Island, and Massachusetts are not remarkable for their mineral springs, though chalybeate springs are common in all. Many of the mineral springs of the New England States are utilized commercially for medical purposes and table-waters, and also as places of resort.

In the Middle States a much larger number of springs is found, and a larger proportion of the waters is utilized, both commercially and as places of resort. Saratoga is the prototype of all other mineral-spring resorts throughout the entire Union. In the Oak Orchard Spring New York has also one of the most celebrated acid springs of the country, while Richfield Springs, Avon Springs, and the Deep Rock Spring are well known far beyond the State limits. In Pennsylvania Bedford Springs is one of the oldest resorts, while Cresson Springs, Gettysburg Katalysine Spring, and many others

are well known. In New York and Pennsylvania, as well as in New Jersey, chalybeate springs outnumber all others. In New Jersey the best-known resort is the Schooley Mountain Spring, a chalybeate spring that has been utilized for many years.

In their geological features the South Atlantic States are not unlike the Middle States, and naturally the springs also are of the same general character. Thermal springs are, however, more numerous, being found not only in Virginia and West Virginia, but also in North Carolina and Georgia, as well as in Florida, where all the springs are slightly thermal and nearly all are sulphuretted. The flow from some of the Florida springs is sufficient in volume to float steamboats of considerable size. Maryland has a fair number of resorts and several well-known waters which are used for commercial purposes. Virginia is, *par excellence*, the mineral-spring State of the section, occupying among the South Atlantic States the same position that New York does in the North Atlantic section; indeed, it is second only to that State in the number of springs that are utilized commercially, and exceeds it in the number of its resorts. The Hot Springs of Virginia are among the most celebrated in the country. West Virginia is equally noted for its springs, having two of the oldest resorts in the United States in Berkeley Springs, at Bath, and the Greenbrier White Sulphur Springs. The general character of the springs in Virginia and West Virginia is the same, saline sulphuretted waters being most numerous, although alkaline, chalybeate, and acid springs are found, both hot and cold. The springs of North Carolina, South Carolina, and Georgia are much like those of the Virginias, and each State has resorts of national as well as local reputation.

The South-Central States include Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Texas, Indian Territory, Arkansas, and Oklahoma. In this section of the country the saline springs outnumber all others, while thermal springs are relatively few. Though a large part of the area is occupied by comparatively recent geological formations, yet in the northern and western portions carboniferous rocks, with the underlying formations, are well developed, and they are usually prolific of mineral waters. Tennessee, Kentucky, Arkansas, and Texas are the important mineral-water States of the section. The Hot Springs of Arkansas occupy a first place among the thermal waters not only of that State, but of the entire country. The springs of Kentucky and Tennessee have had considerable attention paid to them by geologists and chemists, and they have many improved resorts. The Blue Lick Springs are well known. Texas is noted for its springs, among which are a number of acid springs containing free sulphuric acid, and many hot springs in the western part of the State. In Alabama, Mississippi, Louisiana, and Indian Territory there are numerous mineral springs, but apparently they have had little attention paid to them, and we find that fewer have been improved there than in the other States of the section.

The north-central section includes the States from Ohio westward to Missouri and Nebraska, and northward from the Ohio River to the Canadian line. Here the geological conditions are similar to those of the South-Central States, and in both sections saline-chalybeate and calcic waters are abundant, many of them being highly sulphuretted. In Ohio calcic springs probably predominate. The springs of Indiana and Illinois are much the same as those of Ohio. Missouri is a State rich in mineral springs, the Sweet Springs of Saline County being perhaps the best known. The mineral waters of Kansas are drawn mainly from artesian borings, as are those of Michigan also. In both States the waters are well mineralized, sulphuretted saline springs predominating. In the northern part of the north-central section, where there are large areas containing metamorphic surface rocks, the springs are like those of the New England States in their general character, not being as a rule very highly mineralized. The Waukesha springs have a wide-spread reputation, and Wisconsin stands at the head of the list in the number of gallons of water sold from her springs. The springs of Minnesota and Iowa are much like those of Wisconsin, calcic, alkaline, and chalybeate springs being most prominent. The occurrence of acid springs in Iowa is interesting. Dakota has the one thermal spring of the section in the "Dakota Hot Springs" of South Dakota.

The Western States include the Rocky Mountain region and the Pacific coast, with the intervening Great Basin and Plateau region. As already stated, thermal springs are most numerous in this section. California stands at the head so far as the improvement of the springs is concerned, both in respect to the number used as resorts and those whose waters are used commercially. Its mineral waters are of all kinds, and they are not confined to any one section, but are found from one end of the State to the other. With the exception of Wyoming, which includes the Yellowstone National Park, California contains a greater number of mineral springs than any other State.

The Yellowstone Park is, of course, the greatest resort in the United States, and it is deservedly so, not only on account of the presence of its geysers, but also because of the great variety in its springs; when they are better known they will undoubtedly be more highly prized for their medicinal virtues than they are now.

Although there are nearly four thousand springs and one hundred geysers in the National Park, less than one hundred of these springs have had a careful analysis made of their waters. The springs are of course nearly all thermal, and may be classed under three heads,—viz.: (1) calcareous waters, which are generally carbonated to a slight degree, and sometimes are sulphuretted; (2) silicious waters, that are acid, carrying free acid in solution; and (3) alkaline waters, also silicious. Nearly all the springs carry arsenic, varying in quantity from .02 to .25 per cent. of the mineral matter in solution. The waters of one locality in the park are compared

by Mr. Arnold Hague to those of the famous sanitarium of "La Bourboule" in France, which has achieved a wide reputation for the efficacy of its water in nervous diseases.

Colorado, sometimes called the Switzerland of America, has had considerable attention devoted to its springs, and there are now many well-known resorts within the limits of the State, of which perhaps Manitou, near Colorado Springs, is most widely known. A number of the waters are used commercially. Both hot and cold springs are found; many are alkaline, others are chalybeate, and saline springs are numerous. They are sulphuretted and carbonated in many cases.

In Arizona and New Mexico alkaline and saline waters, a large number of them carbonated and sulphuretted, are so numerous that they attract but little attention. They are even more common in some places than springs of pure water. Several springs in New Mexico are utilized for commercial purposes, and Las Vegas Springs is one of the finest mineral-spring resorts in the country. Utah and Idaho both have many well-developed springs. In the former the hot springs at Ogden and at Salt Lake City may be mentioned, and in Idaho, Hailey's Hot Springs and the Soda Springs of Bear River are best known. From the latter comes the Idaho natural mineral water, which is largely sold in the middle West.

Most of Montana's springs are thermal, and they are alkaline, saline, chalybeate, and calcic. Many of them are sulphuretted or carbonated. Among the latter is one closely resembling the celebrated Apollinaris water of Rhenish Prussia. Another spring resembles the Sprudel Spring of Carlsbad. Many of the springs have been improved and are used, to a considerable extent, as resorts. The White Sulphur Springs, Hunter's Hot Springs, and Ferris's Hot Springs are well known locally, while the Broadwater Hot Springs, near Helena, are scarcely excelled anywhere, especially in the matter of improvements. The plunge bath there, connected with one of the hotels, is one of the largest in the world.

Among the Pacific coast States, Oregon comes next to California in the number of its mineral spring resorts, and there are a number of springs both in Oregon and in Washington where the waters are bottled and offered for sale. The State of Washington has the celebrated "Medical Lake," in Spokane County, the waters of which are condensed, and the evaporated salts put up in packages and extensively sold. Lastly, Alaska, whose springs have never been mapped, is a hot-spring territory that has few equals. So far as is known, the springs are generally saline and sulphuretted.

The practical point in this *résumé* of our mineral springs is that, within our own borders, we have springs that duplicate those of Europe, or, indeed, of any other part of the world, and we have them at all elevations, from that of the Atlantic or Pacific coast to the high mountain areas of Colorado, the apex of our country, where the mountain peaks were above the water as islands while the rest of the country was beneath the seas.

We have springs also under all climatic conditions, from the equable climate of Southern California to the glacier-bound regions of Alaska, and from the sunny skies of Florida to the bracing air of New England.

THE TREATMENT OF DIPHTHERIA WITH DIPHTHERIA ANTITOXIN.[1]

BY EDWIN ROSENTHAL, M.D.,

Philadelphia.

Löffler was the first to isolate and cultivate the micro-organism of diphtheria, which had been previously discovered by Klebs, and which now is known as the Klebs-Löffler bacillus.

Löffler, Roux, Yersin, and Sydney Martin have investigated diphtheria; and their experiments have proved that it is not the mere presence of the bacilli that gives rise to all the symptoms which we meet, but that the products, the ptomaines or poisonous substances, attending their growth and multiplication are responsible. Roux and Yersin substantiated their theory by separating the bacillus from the ptomaines and by subjecting the latter to chemical examination and physiological tests. These observers described the disease as a toxæmia differing from other toxæmias in this respect, that the toxin acts as a ferment, which, when injected into living tissues, even in the most minute quantities, produces certain well-defined albuminous bodies. These bodies were subjected to chemical tests by Sydney Martin and resolved themselves into proto-albumose and dextro-albumose. Further studies and experiments upon these substances by Breiger, Fränkel, Proskauer, Wasserman, Roux, and Behring led to a knowledge of immunization. The toxins, as well as the antitoxins, have been shown by Buchner to be probably the direct products of bacterial cells.

The immunity of individuals against disease is understood to depend upon the destruction, by certain agents, of the supposed living cause of the disease. These agents may also act by hindering the growth of the living cause or by destroying its infectious properties through the neutralization of poisonous materials produced in the infected organism or by imparting a higher resisting power to the economy against this poisonous substance. Behring's serum-therapy is based upon these ideas and depends upon his own discovery of the fact that we are able, by the subcutaneous injection of the blood of animals which are rendered immune from the action of certain bacteria, to render other animals immune from the inoculation of the same

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[1] Abstract of a paper read before the Philadelphia County Medical Society, September 11, 1895.

bacteria. Not only does such an injection (*impfung*) protect the animal against living bacteria, but also against their toxins. This fact has also been pointed out by Behring and Kitasato in connection with the tetanus bacillus and tetano-toxin. Formerly, in producing immunity a disease was set up which would protect from a more violent disease. Now, by Behring's method, a substance is injected into the blood which is harmless in itself, but which protects the individual from infection, and from the results of bacterial growth, if he be already infected. The substance which produces this result is known as antitoxin.

In order to obtain an antitoxin which may be used to combat diphtheria, it is necessary to render certain animals immune from the disease by the injection of minute but gradually increasing amounts of diphtheria toxin, which is obtained by the cultivation of the diphtheria bacillus in nutrient broth.[1] The blood of animals thus treated contains the antitoxin. Diphtheria antitoxin, as prepared by Dr. Joseph McFarland, who employs the Roux method, has been described in an article entitled, "Preparation of the Diphtheria Antitoxin," which was published in the INTERNATIONAL MEDICAL MAGAZINE, vol. iv., No. 3, p. 194.

The requirements of the serum obtained by Roux's method, to make it equal to the accepted standard, is that one part shall protect against ten times as many parts of a standard toxin. Thus, if one-tenth cubic centimetre of toxin will kill a five-hundred-gramme guinea-pig, one-hundredth cubic centimetre of the antitoxic serum should cause the animal to recover from the effects of such a dose. Serum thus obtained may be kept for some time before using, provided it is kept sterile by the addition of some antiseptic, such as carbolic acid, trikresol, or camphor. The serum does not retain its power indefinitely, however, but gradually grows weaker.

The antitoxic serum is used as a curative or immunizing agent by subcutaneous injection into the tissues of the body. The sites most frequently selected for making the injection are the back between the scapulæ, the loins, groins, or sides of the chest. The parts should be thoroughly cleaned before the injection is made, and the hypodermic needle puncture should be hermetically sealed by iodoform and collodion after the operation is completed. The amount of antitoxin used depends upon the time of making the injection, the age and body weight of the individual, the gravity of the disease, and upon whether the injection is made for the purpose of immunization or for cure. In the first two days of the disease, if the case be one of average severity, I give an injection equivalent to six hundred antitoxin normals. If the case be seen on the third day, or if at the beginning the infection be such that I believe in the necessity for prompt treatment, as in laryngeal cases or when the lymphatics are involved, I immediately inject ten cubic centimetres, or one thousand antitoxin normals. If within six, twelve, or even twenty-four hours no change takes place, or if the symptoms are ag-

[1] Blutserumtherapy und Geschichte der Diphtherie, Behring.

gravated, I again inject one thousand antitoxic normals of serum, and continue in this way until a decline of the pulse-rate, a lower temperature, and an improvement in the general condition show that there is an amelioration of the symptoms. I have noticed another sign which is manifested in from six to twelve hours, even before the pulse and fever decline, which indicates that I have used sufficient antitoxin; this sign is the appearance of a blood-red line surrounding the diphtheritic patches in the throat. This line is very distinct and shows the demarcation between the healthy and infected mucous membrane. When this line is visible, my experience has taught me to expect a very favorable result in the particular case. The quantity of antitoxin administered may be increased to enormous dosage, and, being harmless, no danger need be apprehended. My own statistics show that two thousand antitoxic normals were sufficient in the most serious cases. The question might arise, What is an antitoxic normal? An antitoxic normal, or an immunity unit, is an amount of antitoxic serum required to save a five-hundred-gramme guinea-pig from the minimum fatal dose of diphtheritic toxin. I use, as an immunizing dose, an injection of one hundred antitoxic normals to perfectly healthy individuals who have been exposed to the contagion of diphtheria.

The question now arises, Is diphtheria antitoxic serum a cure for diphtheria? For diphtheria pure and simple, where no other infection exists, I am prepared to say, yes. Where, however, other infection exists, which is manifested by other symptoms, demonstrated by other indications, and proved by bacteriological examination, I must modify this reply, and, though my success and statistics have been extraordinary, I think it only proper and truthful to say that this is due to a recognition of the other complications and a prompt and careful specific treatment of the same. It is therefore a very rational explanation of the brilliant results which the early use of antitoxin has given. When used before the diphtheria toxins have so invaded the tissues as to destroy them, antitoxin is a specific. Where the complex symptoms are such that life cannot exist (the degenerations of muscles and nerves or the toxæmia or septicæmia), this or any other method of treatment cannot cure. Understanding diphtheria with all the complications that may arise, I modify the treatment and pursue the following method:

After injection of the serum, whether the case was one requiring intubation or not, whatever the variety may be, I immediately ordered a purgative to rid the alimentary canal of any infectious bacilli. For this purpose I give calomel hourly, combining it with salol in suitable dosage, until characteristic evacuations occur. At the same time I administer a judicious amount of stimulants and food. If any complication exists which by its presence endangers life, I administer the antitoxin, but pay no more attention to the diphtheria except to stimulate the patient and to treat the symptoms. For example, if the complication be pneumonia, my whole energy is directed to the lungs, or if it be a nephritis my whole treatment

is directed towards the kidneys. That this is the correct method my statistics, showing recovery of such cases, will prove. In a case of pneumonia in the practice of Dr. Metzler our treatment was mainly directed to the lung infection, and the result was a cure. The same incident was noted in the practice of Dr. H. H. Freund. In a case of acute tubal nephritis seen by Dr. Van Gasken no other remedial agents were employed but those commonly used in such affections. I can therefore safely assert that, while antitoxin is a specific in diphtheria, it is not a cure-all, and, if reliance be placed on this remedy alone, disappointment will be the rule instead of the exception.

That diphtheria antitoxic serum has curative virtues none who understand the clinical manifestations of the disease should deny. Still, there are many who by word and pen decry its virtues and give to it credit for nothing, and who even go so far as to assign to it downright harm. In order to combat these assertions I prepared a list of questions containing the points upon which the antagonists of antitoxin lay particular stress. These questions have been sent to physicians who have used the serum and to hospitals in different cities. The questions I most desired answered were those upon which the antagonists of the serum-therapy laid the most stress. They were the frequency of skin eruptions, joint pains and swelling, renal complications, sequelæ, and the true protective value of immunization.

The question of diphtheria coming as a complication of, as an addition to, or following on scarlatina or measles was particularly interesting to me, as, in my opinion, such cases are the most serious if not the most fatal. In my experience, diphtheria of the larynx (membranous croup) following measles was always fatal under other methods of treatment.

Dr. W. E. Johnson, of Waverly, New York, treated four cases with the diphtheria antitoxin. All four recovered. No bacteriological examinations were made. Six thousand immunity units, sixty cubic centimetres, were administered to a case, aged fifty-six, and two thousand immunity units, twenty cubic centimetres, were administered to each of the other cases. The case aged fifty-six showed joint pains followed by paralysis. One case showed albumin after the injection.

Dr. C. P. Adams, of Trenton, New Jersey, treated two cases with the antitoxin. There were no deaths; but there had been a death in the family previous to the use of the serum. No bacteriological examinations were made. The membranes disappeared on the third day. The pulse and fever declined in from twenty-four to thirty-six hours. There was adenitis in both cases. The injections were made on the second day.

Dr. I. R. Schoonmaker, of Sayre, Pennsylvania, treated two cases. Both cases recovered. No bacteriological examinations. One of the cases was in an adult who received, on the second day, two thousand immunity units twice injected, making four thousand immunity units. The other case was in a child who received two thousand immunity units in two injections. There had been a death in the family previous to the use of the serum.

The membrane disappeared from the child's throat on the third day and from the adult's on the fifth day. The pulse and temperature declined in twenty-four hours. The child presented an erythematous eruption. No complications or sequelæ.

Dr. J. N. Richards, of Fallsington, Pennsylvania, treated a case which recovered. There was no bacteriological examination. The injections were made on the third and fifth days, one thousand immunity units being given at each injection. The membrane began to disappear in from twenty-four to forty-eight hours, and was gone on the third day. The pulse, respiration, and temperature declined in six hours after the second injection. No complications or sequelæ.

Dr. W. S. Long, of Haddonfield, New Jersey, treated three cases which recovered. No bacteriological examination was made. The injections were made in one case on the third day, in another on the fourth, and in the third on the second day of the disease. The membranes disappeared on the fourteenth, seventh, and second days respectively. Urticaria was noticed in the first case, and some paralysis was observed in the first and second cases. Immunization was practised on the third case, in which five hundred immunity units were given. The third week after the injection visual traces of the disease were manifested, and fifteen hundred immunity units were administered.

Dr. A. F. Hyde, of Shelby, Ohio, treated seven cases, with one death. Bacteriological examination was made in one case. The membranes began to disappear in from twenty-four to forty-eight hours after the injection, and in three days they were entirely gone. All these cases suffered from adenitis. In one case pneumonia complicated the diphtheria. As sequelæ, three cases suffered from paralysis. Immunization was practised once, three hundred units being given, and was successful. The fatal case was septic and moribund, dying seven hours after the injection.[1]

Dr. S. I. Bassford, of Biddeford, Maine, treated three cases, with one recovery and two deaths. No bacteriological examinations were made. The first case was injected on the second day of the disease and died of catarrhal pneumonia on the twenty-seventh day after the injection. The second case was cured, and the membranes disappeared in forty-eight hours. The third case died in twenty-four hours of sepsis. The first case developed as a sequel of scarlet fever.

Dr. Wm. McD. Struble, of Trenton, New Jersey, treated eleven cases, with one death from asphyxia. No bacteriological examinations were made. Seven cases were injected on the first day of the disease, two on the second day, and one on the fifth day; each case received one thousand immunity units. The membrane disappeared on the third day after the injections in five cases, on the fourth day after the injections in two cases, on the fifth

[1] Three of these cases were reported in the Columbus Medical Journal, April 30, 1895.

day after the injections in two cases, and on the sixth day after the injections in one case. A decline in pulse and temperature was noticed in from six to forty-eight hours after injection. A slight erythema was noted in half the cases. All cases had enlarged glands, but no suppuration. In two cases albumin was found. Dr. Struble used antitoxin on five cases, with one death; the case could not have recovered under any plan of treatment. He then treated a second series of five cases without antitoxin, and of these two died. A third series of five cases was then treated with antitoxin, and all recovered. The first two cases of a fourth series were so severe that he used the antitoxin, instead of the old method, as he had at first intended, and both recovered.

Dr. G. Metzler treated one case in which no bacteriological examination was made, and which recovered. Five hundred immunity units were injected on the third day of the disease, and the fever and pulse-rate were moderated within twenty-four hours. The membrane had disappeared in three days. Dr. Metzler practised immunization in eleven cases, using one hundred and fifty immunizing units in each case. No diphtheria appeared in any case.

Drs. Eugene F. and Louis Hauck, of St. Louis, Missouri, treated eighteen cases, with two deaths. Bacteriological examination was made in each case. The injections were made on the second day of the disease in six cases, on the third day of the disease in six cases, on the fourth day of the disease in four cases, and on the sixth day of the disease in two cases. Six cases involved the larynx, and five were intubated, with two deaths after intubation. The membranes disappeared in two days in six cases, in four days in six cases, and in five days in four cases. The throat was free from bacteria only after three weeks. The temperature and pulse declined after twelve hours in the majority of cases, in some as early as three hours after the injection. Joint-pains were noticed once. Paralysis appeared as a sequel in three cases. Diphtheria occurred as a sequel to scarlatina once, with recovery. Immunization was practised on two adults and two children with successful results.

Dr. S. J. Ottinger, of Philadelphia, treated one case which died. The case was one in which the membrane involved the larynx, fauces, and nares, and was septic when injected with one thousand immunity units on the seventh day. The dose was repeated in six hours, but the child died fifteen hours after the first injection. There was a decline in pulse, respiration, and temperature four hours after the second injection. Death was caused by paralysis of the heart.

Dr. G. E. Roos, of Scranton, Pennsylvania, treated twenty-five cases, with one death. No bacteriological examination was made. The injections were all made between the first and fourth days, and from one thousand to two thousand units were used. In the case that died the membrane was in the larynx, and the patient had been intubated; death occurred from suffocation due to membrane below the tube. The membranes began to disap-

pear in from twenty-four to forty-eight hours, and the throat was free in from two to eight days. Pulse, temperature, and respiration declined in twenty-four hours after the injection. One case had pneumonia before the injection.

Dr. Alexander Klein, of Philadelphia, treated two cases which recovered. The injections were made on the second and fourth days respectively, and the throats were clear of membrane on the fourth and third days after the injection respectively. Bacteriological examination was made and the bacilli were not found in one month and five weeks respectively. Temperature and pulse declined in twenty-four hours. One case showed an eruption, and the other showed joint-pains. Immunization was practised in eleven cases, all of whom remained well.

Dr. Samuel P. Gerhard, of Philadelphia, treated five cases, all of which recovered. Bacteriological examinations were made in all cases. One case received fourteen hundred immunity units, the others one thousand units each. The injections were made on first, third, second, and fifth days. The throat was free from membrane on the fifth day after the injection in all cases, and from bacilli in from three to ten days. The temperature and pulse began to decline in six hours after the injection. A skin eruption was noted in one case after and in another before the injection. Adenitis occurred in three cases before the injection. Anuria with œdema was seen in one case after injection, due to exposure. Two cases had paralysis as a sequel. One case was immunized successfully.

Dr. H. H. Freund, of Philadelphia, treated four cases with one death. All the cases were laryngeal, and two were intubated, death occurring in one of the cases intubated from œdema of the lungs. In the favorable cases the membrane was gone on the fifth day. A decline in pulse, respiration, and temperature was noted within forty-eight hours. One case had pneumonia.[1]

Dr. Charles D. Spivak, of Philadelphia, treated four cases, all of which recovered. No bacteriological examinations were made. A laryngeal case was intubated several hours before the injection, the membrane disappeared from the fauces in five days, and the tube was left out in sixteen days. Temperature, pulse, and respiration declined in from six to eight hours. One case, which developed as a sequel to measles, had adenitis.

Dr. J. J. Owen, of Philadelphia, treated two cases, with one death. The fatal case was a laryngeal case that had been intubated. The case which recovered required two injections amounting to seventeen hundred units. The temperature and pulse declined in four hours after each injection.

Dr. George A. Muehleck, of Philadelphia, treated twenty-six cases with three deaths. Bacteriological examinations were made in all cases. Forty cases were immunized, all were children, and in one-half the Klebs-Löffler

[1] Reported in the Medical News.

bacillus was found. No case showed visible signs of the disease. In the cases that died the injections were made a few hours before death. In the successful cases the membranes began to disappear in the faucial and palatal cases in from twenty-four to thirty-six hours, in the laryngeal cases in from forty-eight to seventy-two hours. The throat cleared in from five to six days in the faucial and in from seven to ten days in the laryngeal cases. Bacteria were absent in from four to five weeks. The temperature, pulse, and respiration declined within four or six hours. Albumin was found in twelve cases. Paralytic symptoms appeared as a sequel in twelve cases; but disappeared very soon. Three cases developed as a sequel of measles, one of these died.[1]

I have now had under treatment with the antitoxin seventy-eight cases, with two deaths. Both fatal cases had been intubated. Bacteriological examinations were made in the majority of the cases. One thousand immunity units were given at a dose, repeated in from twelve to twenty-four hours if necessary. No joint-pains were noticed. A skin rash appeared in ten cases. Albumin was detected in eight cases and had nothing to do with the administration of the serum. Two hundred cases were immunized, receiving from one hundred to two hundred units as an immunizing dose. Fifty per cent. of these showed Klebs-Löffler bacilli; but not one showed a visible trace of the disease, even when constantly brought in contact with patients suffering from the disease. The patients showed no bad symptoms on receiving this dose. A pregnant woman, late in the course of gestation, received six hundred units as an immunizing dose. Phthisical patients and those suffering from other diseases were immunized successfully. The injections were made from the first to the seventh day of the disease. In the faucial cases the membranes began to disappear on the second day and were entirely gone by the fifth day. In the laryngeal cases stenosis was relieved on the third day; while in those cases intubated the tube was allowed to remain until the fourth day. Bacteriological examination showed the bacilli one month after the injection. Anæmia or other sequelæ were never noticed.

Dr. L. Wolff, of Philadelphia, treated five cases, all of which recovered. Bacteriological examinations were made. One thousand units were injected on the second and third days of the disease. Immunization was practised once successfully. The throat was clear in three or four days. No skin eruption or joint-pains were noted. Adenitis was a symptom. Albuminuria was noted twice. One case was followed by paralysis.[2]

Dr. John Sebastian Miller, of Philadelphia, reported eighteen cases, with recovery in all. Eight cases were successfully immunized. Bacteriological examinations were made in twelve instances. The injections were made on

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[1] Four cases reported in the Medical News; also paper read before the College of Physicians and Surgeons.

[2] One case published in the Medical News.

the first, second, and third days. Stenosis of laryngeal cases was relieved in three days. Four cases had adenitis, and albuminuria was noted once. Five laryngeal cases had aphonia as a sequel, lasting one week. Dr. Miller says, "I have not lost a single case since the antitoxin period, and the majority of my cases were very seriously ill; a death now in my practice would be an exception. Before the antitoxin period I looked upon diphtheria with a great deal of fear, and death was a common occurrence. Despite intubation and tracheotomy, my percentage of deaths was always large. My cases are always serious, and I can find no difference in the gravity except that they recover."

A summary of these reports shows that two hundred and twenty-two cases were treated with antitoxin, with thirteen deaths, a mortality of five and nineteen-twentieths per cent. Twelve of the deaths were in laryngeal cases. Skin eruption occurred in thirty-two cases, joint-pains in three cases, and adenitis in fourteen cases. Albuminuria was seen in twenty-four cases before injection and two cases after injection, anuria in one case after injection; there was no nephritis. As sequelæ, paralysis occurred in sixteen cases, including twelve cases of aphonia. These results are surely not a contra-indication to the further use and observation of this treatment.

There were two hundred and seventy-six cases immunized. One case is reported by Dr. W. S. Long, of Haddonfield, New Jersey, as becoming infected three weeks afterwards. Two hundred and one cases showed bacilli on bacteriological examination.

In conclusion I would say that clinical evidence is in favor of antitoxin, notwithstanding the contrary opinions expressed. For the different monographs upon this subject I am very much indebted to my cousin, Dr. A. Baer, of Berlin, who has also furnished me with my Behring's antitoxin. I am also under obligations to Dr. Roger S. Tracy, of the New York Board of Health, and Dr. S. H. Durgin, of the Boston Board of Health, for their kindness in furnishing me with statistics; also to Dr. Page, of the Boston City Hospital, for his statistics.

CLINICAL LECTURES.

NEURASTHENIA.[1]

LECTURE IN THE DEPARTMENT OF THEORY AND PRACTICE, INTRODUCTORY TO THE SEVENTY-SEVENTH ANNUAL SESSION OF THE MEDICAL COLLEGE OF OHIO.

BY JAMES T. WHITTAKER, M.D., LL.D.

GENTLEMEN,—In accordance with my usual custom, I shall occupy this hour with some remarks concerning the disease which is most prominently before the profession at this time. For several years we had to talk about tuberculosis; once about typhlitis; last year about diphtheria; this year I invite your attention to the study of neurasthenia.

You are not to infer, however, that neurasthenia is a new disease, any more than were tuberculosis, typhlitis, and diphtheria. It is simply that the accumulation of new facts surrounds these affections with unusual interest. Neurasthenia was always known. It was always appreciated that certain individuals have weak nerves, just as others have weak eyes, weak lungs, weak stomachs, etc. But the weakness of the nervous system was not set apart and studied as a separate affection until our own day. As we look back over the history of medicine, those of us who are older, we recognize neurasthenia under other names. Thus, the condition was always confounded with hysteria and hypochondriasis, diseases which are as old as antiquity itself. A large contingent of the cases of so-called spinal irritation we know now to belong to this affection. Neurasthenia often masqueraded under different faces. As we look back we may now see that most of the cases of spermatorrhœa and a right respectable majority of the cases of impotency belong to neurasthenia. That "tired feeling" which was likely known to our ancestors as far back as the most ardent Darwinian can trace is often an expression of neurasthenia.

Neurasthenia, as we now know it, is a disease first recognized in our own country. It was Beard, of New York, who, in 1880, first set apart and distinguished as a separate affection that irritable weakness which distinguishes it and which he very properly named neurasthenia. European writers paid little attention to this distinction at first, but with their idea of the way in which affairs were supposed to be conducted in this country

[1] Abstracted by S. Malsbary, Reporter.

were quite willing to admit the existence of such a disease with us. They spoke of it rather superciliously at first as an American disease. When they opened their eyes a little wider they saw it all around them, and now it is known that neurasthenia is as common everywhere in Europe as with us. It must be confessed that neurasthenia did not quite get the proper recognition at first in the land of its birth. "The prophet is not without honor save in his own country." The term was used derisively, and the reflection was made of sensational attempts at notoriety in nosology. But the truth always prevails in time. After a while it was seen that neurasthenia had a distinct symptomatology which could be covered in under the name of no other disease. Hereupon there was a reaction to the other extreme, and the term came into such general use as to be a kind of mantle for all unknown maladies of a nervous character. Hence there was much abuse of neurasthenia, and the diagnosis of this condition was often established in cases of much more serious organic diseases, as of beginning tabes or dementia, or, indeed, of diseases of very different character, tuberculosis, carcinoma, diabetes, Addison's disease, etc. But time sifts out all errors, and now, in our day, neurasthenia stands apart with a symptomatology whose lines may be distinctly drawn.

The fact is that neurasthenia is the most common of all the nervous diseases. You will be surprised to hear the claim of the best neurologists, that neurasthenia constitutes fifty per cent. of the diseases of the nervous system. It is this knowledge of the nature of the affection and of its great and increasing frequency which gives neurasthenia its present prominence.

Neurasthenia belongs to all ages, to both sexes, and to every walk of life. In regard to sex it differs essentially from hysteria, which affects chiefly women, and from hypochondriasis, which affects chiefly men. Neurasthenia is encountered in every period of life,—from five to seventy-five. Hysteria is more common in earlier life, and hypochondriasis in later life.

In the study of etiology the first attention, as in the case of all the neuroses, must be directed to heredity. The influence of heredity is strong, but not so strong as in the case of hysteria, epilepsy, insanity, and other diseases of the nervous system. Neurasthenia is, of course, never inherited. It is the neuropathic tendency which is transmitted,—that is, the weak nerve-cells whose nutrition is easily disturbed, whose energy is rapidly and readily exhausted. Individuals who come of neuropathic stock, whose ancestors have suffered from insanity, epilepsy, migraine, alcoholism, become easy victims of neurasthenia.

But the condition is more frequently acquired, and most cases owe their origin not to bad inheritance but to bad habits. In early life faulty education plays an important rôle. Men who are engrossed in business and women who are absorbed in society have no time for the training of children, who are turned over to nurses, governesses, etc. In lower life poverty affords a

better excuse for neglect. Among the upper classes the nervous system is exhausted by over-stimulation. Children are allowed to attend theatres, balls, parties, are over-stimulated at school, may be forced to attend during existence of headache, fever, or are allowed to stimulate the nervous system with coffee, tea, some even with alcoholic drinks. What chance has such a child in the struggle for life?

In later life men become exhausted with business cares, the demands of trade, the aggregation of capital, to the exclusion of the small holder, the terrible competition of rivalry; women strain the nervous system in the sacrifice to sustain appearances, the social agonies. It is, therefore, not so much work as worry that does the damage. The steady, plodding, contented, cheerful men and women who do the real work of the world do not suffer. Times of financial depression and panic, disappointment in love affairs, domestic infelicities, discontent, exhaust the nervous system. Then the individual tries to keep up by appeal to stimulants. He takes to drink and he forces sleep with hypnotics. Cases of neurasthenia accumulate in student life towards the end of the term under the process of cramming for examination, when the brain is stimulated to unwonted effort by tobacco, coffee, and alcohol. The abuse of these stimulants simply in self-indulgence leads to the same result. Sexual excesses play an important rôle. Especially do the unnatural perversions of this relation exhaust the nervous system. Finally, in a few cases, the exhaustion may be the result of real disease. Neurasthenia develops occasionally after typhoid fever, perhaps more frequently after influenza. Trauma is responsible for a few cases.

Neurasthenia has a varied but nevertheless distinct symptomatology. We say of hysteria sometimes that it is Protean in its manifestations, and of neurasthenia that it is a real box of Pandora in the variety of its signs. As the name implies, neurasthenia is a nervous weakness, but the weakness is of peculiar character: it is the irritable weakness which stamps the neurasthenia. The emotional nature is affected first and most. The neurasthenic patient loses his interest in life; he becomes selfish, like a hypochondriac, but, unlike an hysterical patient, he is not easily affected by outside influences. The subject of neurasthenia is occupied with his own internal distress. He is in a state of more or less constant excitement, a kind of suppressed excitement which is difficult to describe in words, but may be best expressed under the term anxiety.

The subject of neurasthenia suffers unspeakable anxieties. He is the victim of a thousand fears. The field of philology has been ransacked to describe the apprehensions of neurasthenia. The fear of place is a common form. There are individuals who cannot cross an open space alone. This is the well-known and first described agoraphobia. On the other hand, there are individuals who cannot remain in closed places. This fear is the claustrophobia. I have a patient at the present time who is unable to attend the theatre and who finds it impossible to remain in a street-car. This patient, a highly intelligent, sensitive woman, must sometimes walk

for miles, until she is faint, because she dare not enter a car. These things are not feigned. If you force a neurasthenic patient into such a position the evidence of suffering becomes manifest in the symptoms of depression, sometimes in a cold sweat which breaks out upon the face, sometimes in an outcry which violates proprieties. A more common condition and expression of a lighter form of the disease is a monophobia, in which the individual fears to be alone. Such an individual requires the presence of another person in the room or sometimes even in a carriage, and as to sleeping in a room alone it is entirely out of the question. Then there are individuals who fear the dark, nyctophobia; others who fear storms: I suppose every one here knows of some individual who is afraid of lightning and must darken the room during the prevalence of a thunder-storm. There are individuals also who have a terror of travel, especially upon railroad trains, and who cannot sleep at night on account of the constant apprehension of an accident. The fear of lightning has been characterized as a siderophobia, and of railroad travel as siderodromophobia. Then there is the zoophobia, the fear of animals, the well-known lyssophobia, the fear of hydrophobia, the still better known syphilophobia, and the fear of any disease, nosophobia. There is the fear of man, anthropophobia, the fear of certain definite places, topophobia, the fear of filth, mysophobia. I knew once the case of a lady in this city who covered all her furniture every day with fresh linen, and who slept in kid gloves on account of the fear of contamination. Finally, there is the fear of everything, pantophobia, which is pretty close to insanity. Every gradation of anxiety is offered in these conditions, some of which, like the fear of solitude or fear of the dark, are close up to the line of health. There is every gradation, from the child who is afraid to go to bed in the dark and the old man "who cannot look down from that which is high" (acrophobia) to the individual who is on the verge of insanity. There is every gradation between mere nervousness and neurasthenia. I believe it is in Ecclesiastes that mention is made of the fear of height. It is said that a man cannot look down from that which is high. This is a weakness, the timidity of muscle, which meets an expression also in the peculiar fears of the beginner with the bicycle. All fear is weakness. Stage fright is a temporary neurasthenia. Pantophobia represents the other extreme.

The mind suffers but not to the same degree. The intellect suffers from disuse. It is impossible to concentrate the mind; the very attempt to do so increases the feeling of exhaustion and irritation. The resource of books is lost, the individual may force himself to read line after line and page after page, but without any comprehension of what he has read. Finally, the page presents only a blurred image. All spontaneity is lost. The neurasthenic patient gives out nothing. He loses interest in life. One of the ladies upon whom devolved the duty of entertaining one of the French kings, who had exhausted himself in the round of dissipation, said that it was given to her to amuse the king, who had become *inamusable.*

Scheherezade, who told the story of the Arabian Nights, to save her own neck, could not divert a subject of neurasthenia.

The special senses are not so much affected. Sometimes there are sparks before the eyes, *muscæ volitantes;* sometimes there are noises in the ears, *tinnitus aurium*, but as a rule the special senses are but little disturbed.

It is different with the power of motion. All the muscles are weak. The weakness is expressed first in tremor, which is one of the cardinal signs of neurasthenia. It is a fine tremulous movement, like the vibrations of alcoholism or lead-poisoning, which distinguishes neurasthenia. The patient becomes actually incapable of effort, and sits or lies disinclined to move. The idea of undertaking anything increases the distress. The reflexes are affected in the same way,—that is, they show the stage of irritable weakness. The knee-jerk is rather increased and the muscle and cutaneous reflexes respond too readily.

There is great disturbance in the sensory sphere and rather in the direction of hyperæsthesia than anæsthesia. Every patient complains of some local distress, coldness or heat, numbness, formication, tingling, some form of paræsthesia.

Another one of the cardinal signs is the disturbance in the sphere of the vasomotor system. The face is pale and flushes easily. Sometimes there is pallor on one side and flushing on the other, or rapid alternation of the two conditions. The surface is cool and dry; on exposure to cold the face and hands easily become blue. The patient complains of icy-cold feet.

Insomnia is one of the great distresses of neurasthenia, and is another expression of that irritable weakness which characterizes the condition. Sometimes the patient is unable to fall asleep. He resorts in vain to all the tricks and devices recommended. In other cases he awakens from the first sleep and is unable to sleep again, and so rises exhausted in the morning. Many patients will maintain that they do not sleep a wink all night. Of course this is not true, but it is true that the little sleep they do get is light, and that they awaken so easily from the slightest noise as to seem not to have been asleep.

There is great distress in the genital sphere. Some of the cases have been produced by excesses, more by masturbation, and the irritable weakness itself produces a kind of excitement which finds gratification in protracted and unnatural means. Thus is established a *circulus vitiosus.* There is often a veritable spermatorrhœa. It is not true that most of these cases are simply prostatorrhœa. There is often a paretic condition of the seminal vesicles and a discharge of real spermatozoids. Thus habits of masturbation may produce neurasthenia, and neurasthenia begets spermatorrhœa and intensifies the habit. Most of the sexual perverts are victims of neurasthenia.

Now, the form of neurasthenia may vary. Sometimes the weakness is found chiefly in the brain to constitute the cerebrasthenia. Sometimes it

is in the stomach, gastrasthenia. The great majority of cases of nervous dyspepsia belong to neurasthenia. There is a distinct neurasthenia of the heart, neurasthenia cordis, which expresses itself in the same irritable weakness; the pulse is quick and excitable, any effort increases the frequency of its beats. A sudden knock at the door excites an attack of palpitation; a mere state of expectancy increases the pulse. In still other cases the main expression is in the genito-urinary sphere. The bladder is sluggish; the genital sense is exhausted; the individual is impotent, and the idea of impotency intensely aggravates the neurasthenia.

So you see it is a pretty distinct picture which is offered by this disease, and, while the symptomatology is enormously varied, there are certain cardinal signs which distinguish the affection. There is the state of anxiety which is characteristic. There is the intense preoccupation of mind with his own affairs, a lack of interest in all matters outside of himself. Then there is the heightening of the reflexes, the vasomotor disturbance, pallor and flushing, the tremor, palpitation, and genital disturbance, which make an array of unmistakable symptoms.

Hysteria is a lack of control of the will. The neurasthenic patient may have a strong will. Hysteria has its emotional dramas, peculiar sensory disturbances, globus, clavus, hemianæsthesia, which are unknown in neurasthenia, except in so far as the one affection may be complicated with the other.

Hypochondriasis is the concentration of the mind upon the internal organs. Some hypochondriasis belongs to neurasthenia. All neurasthenic patients are depressed,—as the Germans say, *verstimmt*,—but there is never that intense concentration of mind upon an individual organ, which is so characteristic of hypochondriasis, in neurasthenia. Moreover, the hypochondriac is not weak; on the contrary, he may be very strong. He may make his mind work, and do good work, in the short intervals of time which are not occupied in the expression of his own distresses.

Neurasthenia is such a convenient term that, like malaria, it has been used to cover a multitude of affections. It is an easy cloak to other very difficult diseases; so the diagnosis should be reached by exclusion, and in all cases organic affections must be ruled out. The study of the case will necessitate, therefore, the consideration of tuberculosis, carcinoma, Bright's disease, diabetes, Addison's disease, lead-poisoning, as well as certain organic affections of the nervous system, especially dementia paralytica, locomotor ataxia, disseminated sclerosis, etc. That class of fashionable practitioners who are called "specialists" should not be allowed to make a diagnosis of neurasthenia. They should always call in the general practitioner.

The prognosis in a pure neurasthenia, so far as life is concerned, is not bad. Few cases succumb outright under process of marasmus. But in so far as restoration to complete health is concerned—that is, to restoration of mental tone and bodily vigor—the outlook is not good. In many cases the

disease has lasted so long as to induce the finer organic changes, and in some cases, as we have seen, the condition is engrafted upon an hereditary substratum. But sometimes the disease subsides suddenly. Patients will tell you that the condition of depression and weakness passed away all at once as if a cloud was lifted from the brain. The rule is rather that the amelioration is more gradual and less complete. There are times of weakness alternating with periods of comparative strength. Most patients are left more or less timid and apprehensive. As I have just said, fear is always weakness.

As the disease is built upon weakness, the corner-stone of treatment is the restoration of strength. The weakness is exhaustion, and the exhaustion can be relieved only by rest. The best treatment is therefore the rest treatment, which means tranquillity of mind and body with abundant sleep. The French have a saying, *qui dort dine*, "who sleep dines." The patient should sleep twelve or fourteen hours a day. Reconstruction is effected by food. How can you make a fire burn without fuel? But you cannot start a fire with stone coal. On account of the weak digestion the best food is milk. The patient may take fresh milk, or buttermilk, or some of its substitutes, koumiss, kephyr, etc., one to two quarts per day. The patient should be fed five or six times a day. Milk has the advantage also that it flushes toxines through the kidneys. Some day I will tell you what Aretæus said about milk. Where, for any reason, the patient may not take milk, let it be substituted with mineral waters. Any of our own pure indifferent mineral waters will suffice. The managers of the mineral springs will soon give you an *embarras des richesses* in choice. Any excessive alkalinity may be overcome by the administration at the same time of twelve to fifteen drops of hydrochloric acid in a wine-glass of water three times a day. If there is much fermentation in the stomach give the hydrochloric acid, which is the best eupeptic we have, and let the stomach be washed out once a day. Warm baths, gentle massage, faradization of the spine, stimulate the nervous system and occupy the time and the mind, so that the patient gets the benefit of occupation and suggestion. Of drugs the best is phosphorus, which may be given in substance, as Kassovitz gives it in rickets, or more pleasantly but not so efficaciously in the form of the syrup of the hypophosphites, one or two teaspoonfuls in a wine-glass of water before meals.

Of all the single remedies no one is so valuable as hydrotherapy. The bath should be warm at first and gradually cooler. The patient should be sponged off several times a day, and may with the utmost benefit lie or sit enveloped in a wet sheet an hour or two every day.

The main treatment is the mental treatment. Herein the physician may study the individual, and if possible find and relieve the fault. This part of the discussion is too long for a single lecture. Besides, this treatment must suggest itself to the physician in the individual case.

REVIEW OF MEDICINE.

MEDICINE.

IN CHARGE OF JOHN H. MUSSER, M.D.,

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AND

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On Chancriform Ulcerative Tonsillitis. (*Revue de Laryngologie, d'Otologie, et de Rhinologie*, September 15, 1895.) By Dr. Mendel.

Of all the extragenital chancres, the chancre of the tonsil certainly presents the most varied aspects and ordinarily gives the greatest diagnostic difficulties. The description of this lesion given by Albert Robin is very concise, so that, if in practice the lesion is doubtful, it will often respond to this scheme: a grayish ulceration or formation of ulcers, more or less punched out, with an indurated base and edges, and with disease of the glands. Although this description is so clear, it has not simplified the diagnostic problem. Another lesion exists which presents all these characteristics. This lesion is an affection of the tonsils, which the author has observed six times. It is a tonsillitis slow to develop and which has puzzled the most distinguished syphilographers. The patient complains of feeling a slight pain in one side of the throat at the moment of swallowing. If he is careful, he will himself notice, in a few days, the existence of a small ulcer on one of the tonsils. This lesion is surrounded by a congested area, is a circular ulcer, more or less punched out, is covered by a dirty white coat, which is nothing more than the necrosed tissue of the tonsil, and which can be imperfectly detached. The margin of the ulceration is indurated, the corresponding maxillary region presents several slightly hypertrophied glands, which roll under the finger. There is no fever. The ulcer remains stationary and heals in a varying time, usually requiring no longer than a week. In the presence of such a lesion the diagnosis should not be made hastily. Tuberculosis and syphilis should be thought of. In distinguishing this lesion from tuberculosis the general satisfactory condition of the patient, the integrity of all his organs, even of the pharynx and the larynx, ought to suffice, without speaking of the circular punched-out appearance of the lesion, which is also well defined and of rapid evolution. The diagnosis from syphilis presents other difficulties, and the lesion

is to be distinguished from a chancre of the tonsil and from a gumma. The lesion closely resembles chancre in some of its characteristics; but there are two distinguishing features. A patient having a chancre of the tonsil presents always an adenopathy, which is voluminous and which produces a true deformity of the neck on account of the presence of a glandular tumor larger than a pigeon's egg; while in chancriform tonsillitis the adenopathy exists at its minimum. The second element of importance in the diagnosis is the development of the lesion; the chancre requiring six weeks to develop, chancriform tonsillitis appearing in a week. If there is a history or if there are signs of syphilis present, the diagnosis will be more difficult. The nature of this peculiar tonsillitis cannot be positively decided; all that can be said on the subject is of the nature of a reasonable hypothesis. The opinion is advanced that the lesion is a particular form of herpes, the vesicular stage of which had passed unnoticed. This opinion is based on the condition presented by one of the six cases reported, in which, at the same time as chancriform tonsillitis was noticed, small, linear, whitish erosions were noticed along the margin of the epiglottis.

Forms of Eruption simulating Scarlatina. (*Archives of Pediatrics*, September, 1895.) By A. D. Blackader, M.D., of Montreal.

Anomalous Scarlatina. (*Ibid.*) By Louis Starr, M.D., of Philadelphia.

The scarlatiniform erythemata resulting from the administration of certain drugs are frequently mistaken for scarlet fever. Belladonna erythema closely resembles it. Salicylic acid and its compounds may give rise to a scarlatiniform rash, although this is credited with a resemblance to urticaria. The rashes of phenacetin and phenazon are generally too patchy in character to give rise to a suspicion of scarlatina. Copaiba may also induce a suspicious rash.

Transitory scarlatiniform erythemata are probably often due to accidental absorption of some toxin from the alimentary canal or elsewhere. An erythema following the use of enemata, and the erythematous flushes or distinct rashes occasionally noted in connection with cases of tonsillitis and diphtheria, are of this character. In acute desquamative nephritis we may have a scarlatinal rash with more or less fever and followed by desquamation.

The most important of these rashes, however, is seen in those cases of rötheln or rubella which present a scarlatinal rash with fever and tonsillar congestion. Here time is an important factor. The disturbance of the nervous system and the pharyngeal congestion are greater in scarlet fever. The cervical glands are enlarged early in rubella, while in scarlatina, if enlarged at all, it occurs at the end of the first week. Blackader does not find the quick pulse of as much diagnostic value as most writers.

Starr presents a series of six cases, scarlatinal in character, the first presenting an anomalous rash without other symptoms, and each successive

case adding a few details to the picture, the last two being unmistakable in type.

Cases I. and II. occurred in the same family, one sickening seven days after the other. Cases III., V., and VI. were also children of one family, two having been infected from the doubtful case.

The rash in the first four cases possessed many points of resemblance; the early eruption was erythematous, punctate in places, and of a reddish-purple tint in some regions. Maculo-papules were found as the rash extended. The desquamation was distinctly scarlatinal in type. In Cases I. and II. the temperature showed no appreciable elevation and the pulse was not accelerated. In Case III. vomiting occurred at the onset, and the temperature rose to 100° F. on one day. In Case IV. nephritic symptoms appeared during convalescence. Cases V. and VI. were attended with moderate elevation of temperature and increased pulse-rate for several days, and were distinctly scarlatinal in character.

The Lingual Traction Method of Artificial Respiration. (*Therapeutic Gazette*, August 15, 1895.) By A. E. Russel, M.D.

This author has used successfully the Laborde treatment for recuscitation of the new-born in two cases where the ordinary methods of artificial respiration were without the slightest apparent effect. After the fifth or sixth traction emesis was provoked and was followed by shallow respiration.

The mechanism of this operation is explained by Dr. Laborde as being the stimulation produced by the traction of the tongue on the sensory nerves and the reflex action on the principal motor nerves distributed to the muscles of respiration. The return of the contractions of the diaphragm is the first result produced by these lingual tractions, feeble movements at first in the epigastric region, afterwards extending upward to the thoracic region, and, last of all, the action of the muscles of the face, nose, etc.

Over fifty cases in which this method has been used for the treatment of asphyxia in the new-born have been reported from different parts of Europe. The president (M. Rochard) of the Academy of Medicine of Paris, in his report of work done in the year 1894, says, "He [Dr. Laborde] has received from all parts evidence which confirms his statements, and this year he has had the extreme satisfaction to note that colleagues up to the present time incredulous or indifferent publicly admit before this society the excellence of this method after having seen it succeed in almost desperate cases. This justice has been rendered him by Drs. Lancereaux, Verneuil, Labbe, and Perier. At the present time the lingual traction method may be considered as classic in all the cases of apparent death."

The Immediate Care of Persons found Unconscious on the Streets.—An editorial in the July 27 number of the *Medical and Surgi-*

cal Reporter, after denouncing the inefficient aid given to persons found unconscious on the streets, calls attention to a circular issued by a committee of the Medical Society of the County of Kings, which contains methods insuring prompt medical and humane treatment to those who for any cause are rendered unconscious on the streets or elsewhere. The following points are recommended to the consideration of the members of all medical societies, health boards, managers of hospitals, police authorities, etc.:

1. Whenever a person is found in an unconscious or semi-conscious state on the street or elsewhere away from his own home, the police, when notified of such case, shall immediately summon medical aid; sending for the ambulance surgeon, or for the police surgeon; or in towns where there are no such officials, then for the nearest physician, who should be compensated for his services by the authorities.

2. The police shall not decide as to the disposition of such a case, but must await the decision of the ambulance surgeon, police surgeon, or of the physician called, and must act in accordance with such decision.

3. A police officer who acts in opposition to such decision should be by the ambulance surgeon, the police surgeon, or the physician, reported to the police commissioner, who should subject such officer to discipline, rules governing such cases having previously been made and promulgated.

4. Ambulance surgeons should give prompt and immediate aid to patients found in the condition hitherto described, and remove them to the nearest hospital, or to their homes when ascertainable, according as their judgment dictates is the best course to pursue in the interest of the patients. The existence of an alcoholic complication in the case should in no wise adversely influence the surgeon or physician called as to the disposition of the case, as such a complication often renders skilful medical treatment the more imperative.

5. Ambulance surgeons, and other medical men, brought in contact with cases in which alcoholism is a frequent complication, should be reminded that this condition often renders an immediate diagnosis impossible in the most serious and oftentimes fatal forms of cerebral disease and injury, as well as in other diseased conditions.

6. The examination of ambulance surgeons should include the differential diagnosis of alcoholic coma from other forms of coma, and the various diseases or injuries that may produce a condition simulating alcoholic intoxication.

7. Hospital authorities receiving financial aid from the city should not refuse admittance to patients suffering from supposed alcoholism, for in so doing they are liable to be contributory to the death of such patients. They should know that, if the condition be one of uncomplicated alcoholism, this fact will in a short time be revealed, and other disposition may be subsequently made of the case; while, if the patient is so affected as to need immediate and skilful treatment, his rejection by the hospital authorities may conduce to a fatal result. If they refuse to receive such cases,

because complicated with alcoholism, they should be held legally responsible for the results. And, further, if such refusal is persistent after their attention has been called to the matter, the city authorities should strike the name of such hospital from its list of beneficiaries.

8. The municipal authorities should also consider the question of the establishment of a special emergency hospital, or hospitals, conveniently located with reference to the various districts of the city; or a system, similar to that of the Bureau d'Admission in Paris, connected with which there is a special hospital for all cases of alcoholism, or cases complicated with alcoholism, that may occur in the streets of that city. Or, the authorities might consider the establishment of a special department in connection with the hospitals of the city, similar to the "Alcoholic Wards" of Bellevue Hospital, New York, where more than four thousand alcoholics are annually treated. Such a plan would relieve the general hospitals of the burden of such cases, or compel them to make special provision for their care. Should the existing methods prove inadequate, the committee recommends some such plan as is here outlined.

THERAPEUTICS.

IN CHARGE OF ALEXANDER D. BLACKADER, B.A., M.D.,
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ASSISTED BY
D. J. EVANS, M.D.

Creosote Carbonate in the Treatment of Pulmonary Tuberculosis. (*New York Medical Journal*, August 7, 1895.) By Louis Fischer, M.D., of New York.

By the introduction of creosote carbonate as a substitute of the crude drug von Heyden placed at the disposal of the profession a non-irritant, non-poisonous preparation containing ninety-two per cent. of the purest creosote from beechwood tar, chemically combined with eight per cent. carbonic acid, borne well in large doses by the most delicate stomachs. It has made it possible to employ the drug in sufficiently large doses, so that the results obtained have been very good. To prove the elimination of the drug, not only the breath gives ample evidence of it, but also the dark color of the urine shows that the drug has been absorbed and excreted.

In the cases reported the hygienic surroundings have been of the poorest, and, although the author does not wish to state that the patients would have been cured unless other factors had been considered, he attributes the result mainly to the efficacy of creosote carbonate. The test for determining a benefit has been the scales, any increase in weight, allowing for the normal physiological increase of weight in children, being attributed to the efficacy of the drug.

In the case of a girl, twelve years of age, with catarrhal tuberculosis affecting the apices of both lungs, the process was arrested in its incipiency. Three drops of creosote carbonate were given three times a day, with an increase of two drops each day until twenty drops were given for a dose. The child gained twenty-nine pounds in nine months, and the tubercle bacilli, plentiful in the sputum, expectorated in the early morning hours, entirely disappeared.

Another child, two years old, weighing twelve pounds, was given two drops, and the dose increased one drop every three days until ten drops were given three times a day. The emaciation, excessive diaphoresis, and cough began to disappear after the first ten days, and later the tubercle bacilli which were found in muco-purulent matter in the fæces disappeared.

The author wishes to emphasize the importance in these cases of making a correct clinical and bacteriological diagnosis; of determining the patient's weight, allowing for physiological increase; and, in giving the drug, of increasing the dose after an interval of a few days. He has seen the best results from the administration of creosote carbonate after meals. An examination of the blood of patients during the course of the treatment has shown that the percentage of hæmoglobin is materially increased, and that the relative proportion of the red and white blood-corpuscles is considerably increased in favor of the red corpuscles.

The Inquiries of M. Reichmann upon the Influence of Bicarbonate of Sodium upon the Stomach Secretion. (*Gazette des Hôpitaux*, September 10, 1895.) By Dr. Albert Mathieu.

M. Reichmann, after a series of personal observations, concludes that bicarbonate of sodium has no action upon the secretory power of the stomach; it always influences the gastric juice already secreted in a manner which tends to neutralize it and to make it alkaline. According to this statement one can expect only to diminish the total acidity of the stomach contents by the use of the bicarbonate of sodium: he cannot expect to influence the secretion of the stomach mucosa itself for a single meal or for a period of time more or less prolonged, neither immediately nor slowly. The symptoms caused by the exaggerated acidity of the gastric juice will then be the only indications for the therapeutic use of the bicarbonate. It will be able to render signal service, for instance, in saturating the hydrochloric acid in excess in the hypersecretion of hydrochloric acid; but it will not produce any lasting benefit or any definite cure of the disease. The following objections may be made to Reichmann's conclusions: First, the technique which he has followed is far from being perfect; second, the examination of the gastric juice has often been made too soon after the administration of the drug, before it has had time to produce appreciable modifications in the secretion of the stomach; third, certain of his results are contradictory to his negative conclusions; and, fourth, he has not taken into

account the operation of dyspepsia, an element which former experiments have shown to be of great importance. The author thinks that bicarbonate of sodium, properly employed, ought to stimulate the glands of the stomach to their maximum secretion. The augmentation of secretion is naturally more apparent in hypo- than in hyperchlorhydrie. When the dose given is too large, or when the use of the bicarbonate is too prolonged, a diminution of the secretion ought to succeed the augmentation. This depressing influence is much less marked in cases of hyperchlorhydrie. Severe cases of the hypersecretion of hydrochloric acid do not appear, in general, to be sensibly influenced by the prolonged use of alkalies. There is, without doubt, in these patients an increase in the number of border cells which secrete the hydrochloric acid. The present state of our knowledge of the influence of the bicarbonate of sodium upon the secretion of the stomach may be summed up as follows:

1. Bicarbonate of sodium produces immediately the total or partial saturation of the acidity of the stomach.

2. When the dose used is sufficiently large the alkalinization remains definitely and the peptic digestion is stopped.

3. With a smaller dose the secretion of hydrochloric acid continues after the bicarbonate of sodium has been completely transformed into chloride of sodium, and it should be even stronger than before.

4. When one gives a sufficient dose of bicarbonate of sodium an hour before the meal, the motion and secretion of the stomach are excited. The excitation of the secretion appears more marked in the cases of hypo- than in the cases of hyperchlorhydrie, when the hypochlorhydrie is not the result of a too far advanced atrophy of the glandular elements.

5. It is necessary to give account, not only of the immediate action of the bicarbonate of sodium upon a meal, but also of the prolonged and distant action of the remedy.

The Antiseptic Treatment of Typhoid Fever with the Chlorine-Quinine Solution. (*Medical News*, September 14, 1895.) By Emil King, M.D., of Fulda, Minnesota.

A country practitioner is forced, from considerations of expense, convenience, and prejudice, to adopt some line of treatment in cases of typhoid fever other than the Brand method. Of all the methods of treatment receiving professional sanction, the one having antiseptics for its basis seems the most rational. No one of the advocates of the antiseptic treatment claims that he can obtain an aseptic condition of the intestinal walls; but it is claimed that the bacterial growths can be kept down to small numbers and in a low state of vitality, and that the bacterial poisons are very much lessened, and consequently not present to be absorbed. The main point to be considered in choosing an intestinal antiseptic is to get one that is readily soluble, very diffusible, easily absorbable, and that is, in overdose, harmless. The substance best combining these advantages is chlorine. The chlorine-

quinine treatment was originated by J. Burney Yeo, of London, and has been successfully employed for about twenty years. The best results are obtained if the case is seen early; but even at a late stage the remedy will have a good effect. The advantages in favor of this line of treatment may be enumerated as follows:

1. The temperature is materially affected, being appreciably lowered. It seldom rises above 102.6° F. after the medicine has been administered for two days.

2. There is almost an entire absence of nervous symptoms. The so-called typhoid condition does not develop. The patient is usually able to get considerable sleep, and the headache soon disappears.

3. The general condition of the alimentary canal is much better. The foul tongue clears to some extent, so that it may even lose its peculiar character; the stomach retains nourishment better; diarrhœa is seldom severe, and tympanites does not develop except over a limited area in the right inguinal region.

4. The duration of the disease is distinctly shortened, and convalescence is more rapid. Many cases will show a normal temperature by the eighteenth day, few going on to the twenty-fourth. Convalescence is more rapid because the patient is not so weak.

5. Complications are fewer, and the mortality is greatly lessened.

In this country twenty-six cases have been reported, with no deaths.

On the Use of Aristol Subcutaneously in the Treatment of Tuberculosis. (*Therapeutische Wochenschrift*, September 1, 1895.) By S. S. Grusdieff, of St. Petersburg.

The author gives first an extensive history of this medicine, which was produced by Messinger & Wortmann in 1890, and was first used by Nadaud in tuberculosis. The results he obtained were favorable, while those observed by Ochs, using the drug in the same manner, with a one-per-cent. solution of aristol in sweet almond oil (filtered and heated to 120° C. for some hours), were not so promising. Grusdieff's observations were made in the Sailors' Hospital in Kronstadt in 1893 and 1894, December to February. He used for injection solutions of one to fifteen per cent., in the beginning pure, in the second week with an addition of cocaine. The injections were made at the back two or three times a day for three or four weeks. Patients complained of severe pains, lasting two or three hours after injection, but later got accustomed to them. Thirty-three patients were treated for tuberculosis, eight of these stopping treatment after the tenth day.

The treatment consisted exclusively in injections of 0.01 to 0.45 aristol per day. Neither narcotics nor antipyretics were given.

The author gives then the details of the observations, and comes to the conclusion that the truth lies between the two different opinions of Nadaud and Ochs. Grusdieff does not doubt that in the great majority of patients suffering from tuberculosis, apart from the pain, which is not so difficult to

bear, the aristol injections are not harmful, but do not influence much the process in the lungs, while in a few cases it can be of great use.

As there are so few means to fight tuberculosis, excepting climatic treatment, which can be used by but few people, he recommends the further study of the aristol on animals as well as on men, to see if good effects can be obtained in the end.

SURGERY.

IN CHARGE OF HENRY R. WHARTON, M.D.,

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AND

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Fractures of the Lower Extremity treated by Fixed Dressings and Early Motion. (*Beiträge zum Centralblatt für Chirurgie*, No. 27, 1895.) By Professor Bardeleben.

This author reports the results of his method of treating fractures of the lower extremity with dressings permitting the locomotion of the patient and the employment of early passive motion.

This method was employed in all cases except in the aged and infirm, the very young, and in those cases in which amputation was a possibility. In the past year he treated fifty-eight cases of fracture of the lower extremity including the patella, making a total of one hundred and eighty-one cases in which he has employed this method. In no case were the results other than could be desired. The advantages to the general health of the patient and to the affected member were always marked. The time required for healing was shorter than usual. There were no complications, such as muscular atrophy, senile catarrh, and delirium. Joints not involved in the fracture could be easily moved after healing had taken place.

Three Cases of Laparotomy for Penetrating Wounds of the Abdomen, with a Report of Fifty-six Cases. (*Boston Medical and Surgical Journal*, July 25, 1895.) By Charles L. Scudder, M.D.

The causes of death in the cases tabulated were as follows: Wound of the colon; wounds of the small intestine; infection from a hernia of two feet of bowel through the perforated abdominal wall; wound of the liver, the kidney, and the chest wall; two cases of wound of the spleen, death from hemorrhage; gangrenous hernia through the abdominal wall; stab in a pregnant woman; hernia of the bowel, great shock, abortion, peritonitis; secondary infection from abscess at seat of injury.

From the study of these cases the following conclusions were reached: Given an abdominal wound, proof of penetration through the peritoneum should be sought. This is best accomplished by enlargement and careful investigation of the original wound. Penetration having been found, immediate enlargement of the wound should be made for careful exploration of the abdominal contents. Irrigation with warm salt solution should be employed if there is any soiling of the peritoneum, and if there is much blood present. The use of the probe to determine penetration is often misleading, and may give a false sense of security. The absence of shock does not disprove the presence of grave intraperitoneal lesions. A small parietal wound is not incompatible with grave intraperitoneal injuries, as is evidenced by one of the cases. The possibility of intraperitoneal strangulation through the wounded omentum must be kept in mind. Dennis, Morton, and Markoe each report a case of intraperitoneal strangulation associated with the conditions resulting from a stab. The objects of a laparotomy following intraperitoneal stab-wounds of the abdomen are to discover (if present) and check intra-abdominal hemorrhage, to close perforations of viscera, and to prevent peritonitis and sepsis.

The Origin of the Stitch Abscess. (*Beiträge zum Centralblatt für Chirurgie*, No. 27, 1895.) By Dr. C. Lanenstein, of Hamburg.

The author's attention was attracted to the study of this matter by the observation of infection occurring after aseptic operations which could only be explained by supposing the infection to be due to suture or ligature material. Consequently, he instituted a bacteriological examination in the case of two hundred and sixteen specimens of sutures and ligatures. In these two hundred and sixteen specimens he found sixty-four which contained bacteria that were capable of development. The majority were bacillus subtilis, which was found in different culture media, including gelatin, glycerin, agar, bouillon, blood serum, and alkaline albuminate. He also found the micrococcus tetraginus and the staphylococcus albus. The author comes to the following conclusions:

1. Clinical observation teaches that cases of suppuration occur which have their origin in the catgut employed in the wound.

2. It cannot be said for certain in any individual instance that the catgut has been the bearer of the infection.

3. It is nevertheless certain that the so-called sterile catgut of the shops contains germs capable of development.

4. So long as this is the case the catgut cannot be free from the suspicion of having given rise to the infection of a wound.

In the discussion which followed, Kocher, of Bern, said that since 1888 he had used silk in his enucleations of goitre. This can be absolutely sterilized either by dry or moist heat, an impossibility with catgut. In referring to his cases he had only thirty-five per cent. heal by primary union while he used catgut, while eighty-five per cent. healed in that manner

since he began to employ silk. Kocher believes that the suture material should be not only aseptic but also antiseptic, and has, in consequence, during the last winter kept it in a solution of arsenious acid, with the result that he has, in thirty-five cases in which it was employed, secured absolute primary union.

The Radical Treatment of Hydrocele by the Injection of Iodine, and its Final Results. (*Beiträge zur klinische Chirurgie*, Heft 3, Band xiii., 1895.) By Dr. Spahinger.

After a careful comparative study of the methods employed for the radical cure of hydrocele, both by incision and by the injection of iodine after puncture and withdrawal of the fluid, the author comes to the conclusion that, in every case, that operation is to be performed which produces the least functional derangement, which has the shortest course, and which has the least chance of unforeseen complications.

Puncture with the injection of iodine, he believes, fulfils these conditions more nearly than any other method, although it has a greater percentage of relapses. It should be used in all normal cases, the operation by incision being reserved for persistent and complicated cases.

The author bases his opinion on results obtained in the Zurich clinic. Of seventy cases treated, forty-eight were injected with iodine; thirty were cured, five relapsed, and thirteen were not heard from later. The average length of time in the hospital was fourteen or fifteen days. Of seventeen cases treated by operation twelve were cured. No relapses were seen, although five cases were not heard from. The time spent in the hospital was, however, on the average from thirty-eight to forty-two days.

Puncture of the Spinal Meninges. (*Berliner klinische Wochenschrift*, April 1, 1895.) By P. Fürbringer, M.D.

The Diagnostic Value of Lumbar Puncture. (*Ibid.*, July 8, 1895.) By E. Stadelmann, M.D.

Fürbringer has treated eighty-six cases, making more than one hundred punctures. The technique of the operation is very simple. The patient is placed in a sitting posture with the body bent forward, and the puncture is made at the level of the under surface or at the extremity of the spinous process. With Naunyn and Lichtheim the author holds that an anæsthetic is unnecessary. He finds that the aspiration of the fluid causes more pain than the puncture. The head, neck, and back are complained of. To prevent this he now uses a Pravaz syringe instead of the needle. The quantity of fluid withdrawn varied from a few drops to one hundred and ten centimetres. It was occasionally bloody or stained.

In thirty of thirty-seven cases of meningitis the tubercular character was proved by the presence of tubercle bacilli in the cerebro-spinal fluid. The author considers this method as bearing the same diagnostic value in tubercular meningitis that the bacteriological examination of the sputum,

the pleural and peritoneal fluids, and the urine does in tuberculosis of the lungs, the kidneys, etc. In one case pus was withdrawn.

The therapeutic results were not very promising. In a case of chronic hydrocephalus with epileptiform attacks the fits were lessened by puncture. In three cases of cerebral tumor, one had less headache, one did not improve and proved syphilitic, and one died suddenly the next day. In two cases of chronic diffuse nephritis no improvement took place.

Stadelmann reports two cases similar to one cited by Lichtheim in which the symptom-complex indicated purulent meningitis, but the aspirated fluid was only very slightly cloudy and contained no micro-organisms.

In the first case an autopsy revealed a fracture at the base of the cranium, fissures of the orbital roofs, and pus and blood on the surface of the convexity of the brain.

The second patient had for a long time complained of headache and nausea which followed a purulent otitis of the left ear. On entering the hospital the case presented the clinical picture of purulent meningitis. Lumbar puncture was made and a water-clear sterile fluid obtained. At the autopsy chronic purulent meningitis was found with pus containing staphylococci and streptococci.

The author concludes that a cerebral meningitis may run a long course without extending to the spinal meninges, and that although the diagnostic value of spinal puncture is greater than its therapeutic or curative effects, it is not entirely positive. Errors in diagnosis may occur in the following manner. The aspirated fluid in purulent meningitis may be, as in the cases cited, clear and sterile, causing the exclusion of pus. In a certain percentage of the cases of tubercular meningitis the tubercle bacilli are not found. In all cases where a clear sterile fluid is aspirated the diagnosis may vary between chronic hydrocephalus, cerebral tumor, and simple serous meningitis.

The author also calls attention to the following points: 1, the occasional painfulness of the aspiration; 2, the varying quantity of fluid withdrawn without regard to the amount of pressure. Both conditions find an explanation, in the author's opinion, in the partial occlusion of the canal, usually between the fourth and thirth ventricles, which, whether due to inflammation, to coagulation, or to pus-flakes, causes the fluid to flow slowly through the remaining pervious lymph-spaces, and a low pressure results. The brain, after the draining of the subarachnoidal fluid, becomes sucked as it were by the dura and pressed against the cranium, causing the severe pain.

Imbrication or Lap-Joint Method. A Plastic Operation for Hernia. (*Chicago Medical Recorder*, August, 1895.) By Edward Wyllys Andrews, M.D., Chicago.

The interlocking or overlapping principle of uniting the musculo-aponeurotic layers of the abdomen was first adopted by the author as an expedient in cases where the Bassini operation seemed difficult and supplementary tissue was needed to aid in filling in the gap around the ring; but

in practice the value of the principle became more and more evident, and he now employs it in all his operations. It consists in the incorporation of a strong layer of external oblique aponeurosis into the posterior wall of the canal, along with as much conjoined tendon and transversalis fascia as can be found, and the preservation of another flap of the same strong fascia to form the anterior wall. The purpose is to lap joints in uniting the several layers of the wound. In the completed operation we thus have three strong layers of aponeurosis in the place formerly occupied by two, two of these being at a point of greatest strain,—namely, behind the cord,—and all shortened or narrowed by an amount equal to the extent of overlapping.

Conclusions: Any successful method of radical cure must be a true plastic operation upon the musculo-aponeurotic layers of the abdominal wall. Cicatricial tissue and peritoneal exudate are of no permanent value.

NEUROLOGY.

IN CHARGE OF LANDON CARTER GRAY, M.D.,
New York City,

GUY HINSDALE, M.D., Philadelphia, AND WILLIAM BROADDUS PRITCHARD, M.D., New York City.

Total Compression of the Upper Dorsal Cord. (*Archiv für Psychologie und Nervenkrankheiten*, vol. xxvii., No. 1.) By F. Egger, M.D., former assistant to Professor Hitzig.

The author describes a case of trauma of the first dorsal segment. The patient survived total destruction of the cord at this point eleven years. This alone is sufficient to make the case remarkable. The patella reflex failed, the plantar reflex was present. There was a considerable degree of mental disturbance (hallucinations). At the autopsy the cord was found compressed by the upper dorsal vertebræ, much altered in shape, and without the slightest trace of the normal division of the white and gray matter at this level. Microscopically a descending comma-shaped degeneration was found in the positive cord as far as the tenth dorsal. This long extent makes it doubtful if it can be considered the same as the well-known band of descending fibres described by Schultze. Above the lesion the direct and crossed pyramidal tracts showed a retrograde degeneration. The muscles, especially those of the lower extremities, showed marked degenerative change. The author discusses the loss of the knee-jerk in total cord destruction, claims that the honor of noticing this fact for the first time does not belong to Bastian, but to Kadner (1876), and thus brings the German school into prominence. He suggests that the mental disturbance may have been due to a loss during eleven years of all sensation from a large part of the body, and to vasomotor trouble. He speaks of the theory of Allen Starr (*Brain*, iii., 1894) for the wrong location of sensation, but

concludes that in his own case the twistings produced in the lower part of the body were transmitted to the sensitive portion above the third rib, and thus led to a mistake in location on the part of the patient. Loss of patella reflex can be due to such muscular change as was found in this case, but such a theory does not explain the loss which sometimes occurs immediately after a total transverse lesion high up in the cord, before muscular atrophy has had time to develop. He discusses at length the loss of the knee-jerk, and calls attention to the fact that in some cases of cerebellar tumor where this has failed change has been found in Westphal's entrance zone of the lumbar cord; that in other cases great central pressure had been noticed at the autopsy. Especially in cerebellar tumor is such pressure common.

W. G. S.

Experiments upon the Influence of Sensory Nerves upon Movement and Nutrition of the Limbs. (Communication made to the Royal Society, March 7, 1895.) Preliminary communication by F. W. Mott and C. S. Sherrington.

All the sensory roots pertaining to the arm and leg were cut. When the monkeys recovered from the narcosis a loss of movement was at once noticed in the hand and foot,—in the upper portion of the limbs this was seen in a less degree. After the sound members were tied the animals were unable to seize and carry any food to their mouths. There was slight flexion in both limbs. After a period of three months no change in the condition had occurred. The associated movements were much less influenced; the finer, more specialized movements were those most affected.

When the cortex was irritated by medicinal means the epileptic convulsions thus produced were equal on the two sides. It was then shown that there is a difference between voluntary movements and those due to cortical irritation; for the fomer the entire sensory tract from the periphery to the cortex is needed.

To produce any marked change in movement all the sensory nerves supplying a part must be cut, otherwise those which are left act vicariously, and when only one is cut anæsthesia is not even produced.

When the fibres which supply the muscles are spared, and the others in the part are cut, the disturbance of motion is equally great, thus showing that the muscular sense is not of great importance in these experiments.

Wounds intentionally produced healed as rapidly on the paralyzed side as on the sound, and no trophic disturbances were noted.

Judging from the secondary degeneration all the fibres of the column of Goll seem to come from the lower extremities; roots which were cut higher up produced no marked change in this column.

The chief value of the experiments lies in the demonstration of the necessity of centripetal impulses from the skin and partly from the muscles of the palm of the hand and sole of the foot for the production of the finer movements of the extremities.

W. G. S.

Abscess of the Brain from Ear-Disease. (*Edinburgh Medical Journal*, August, 1895.)

Dr. Leith recently exhibited before the Medico-Chirurgical Society of Edinburgh the temporal bone of a girl, aged fifteen, who died from symptoms pointing to tubercular meningitis. She was only fifteen hours in hospital. The real cause of death, as ascertained post mortem, was a large abscess immediately below the convolutions, just at the junction of the parietal and occipital lobes, two inches in diameter, and with a well-formed capsule indicating a duration of at least three or four months, and probably much more. It was nearly as large as a duck's egg. There was extensive encephalitis in the neighborhood, extending especially downward and inward, the greatest prolongation being towards the internal capsule, into which it would probably soon have discharged. He examined the right ear and found a striking condition of the tympanum. The lining of the middle ear was caseous, evidently from caries, and soft enough to be cut away with a knife. The tympanic membrane was seen to be completely ossified, and showed a large perforation of the size of a porcupine quill at the upper end. The ossicles were perfect. The tubercular process had just extended towards the inner ear. It did not affect the mastoid cells. He believed the bone on the other side was also affected, but could not be absolutely certain. The first symptoms appeared three weeks before admission, headache and vomiting, which persisted for two days and gradually disappeared; but the headache persisted, and the patient remained in bed and became drowsy, and finally comatose. The eyes were not examined until after admission. The house-physician examined the left eye and found marked optic neuritis.

There was no ear-discharge, but Dr. Leith found a plug of wax about one inch long filling up the external meatus.

Insanity and Bright's Disease. (*American Journal of Insanity*, July, 1895.) By E. D. Bondurant, M.D.

The author has examined seventeen hundred cases of insanity admitted during the last four years to the Alabama Insane Hospital, besides chronic cases, chiefly chronic resident at the beginning of this period. At least one careful physical examination and urinalysis has been made, and in those cases where bodily disease of any importance, real or otherwise, has been noted there have been repeated examinations of the urine. Post-mortem renal lesions have been studied microscopically in more than two hundred cases. Dr. Bondurant finds that albumin, together with renal tube-casts, can be detected in the urine of more than one-half the cases of chronic insanity treated in this institution, and in the urine of quite seventy-five per cent. of the cases of recent insanity admitted. That a large proportion (*not all*) of the patients whose renal secretion is thus abnormal exhibit at some time some other evidence of renal disorder. That a smaller percentage, say twenty-five per cent., of those whose urine contains tube-casts

and albumin present such clinical evidences of nephritis as would enable any competent practitioner to make the diagnosis of kidney-disease or complication without examination of the urine. That seventy-five per cent. of the kidneys examined post mortem show pathological changes.

Finally, the facts obtained seem to justify the opinion that many of the patients (not all) in whom insanity and nephritis coexist are insane because of the nephritis,—*i.e.*, the insanity is one of the mental symptoms of acute or chronic uræmic intoxication.

OPHTHALMOLOGY.

IN CHARGE OF CHARLES A. OLIVER, A.M., M.D.,
Philadelphia, Pennsylvania,
AND
EDMUND LANDOLT, M.D.,
Paris, France.

Atheroma as a Complication in Cataract Extraction. (*Fort Wayne Medical Magazine*, August, 1895.)

K. K. Wheelock, of Fort Wayne, Indiana, believes that atheroma constitutes an element requiring very careful consideration in the operation for cataract. This he bases upon three carefully-detailed cases occurring in his own practice. He says that the fact "that the surface operated is small does not lessen the fact that structural changes dependent upon defective nutrition may follow the incised wound made in the cornea, because this tissue must be repaired both by direct blood-supply, as well as indirectly through imbibition, depending upon the location of the wound." He thinks that if the incision lie within scleral tissue, we have direct repair; if in the corneal tissue wholly, then the repair is by imbibition. He believes that the form of destruction following operations on tissue supplied by atheromatous vessels is molecular gangrene or necrobiosis, as in this form the nutrition is most interfered with in the process of reforming the structural elements.

Several Considerations on the Application of Electrolysis in Twelve Cases of Detachment of the Retina. (*Annales d'Oculistique* (English edition), July, 1895.)

Based upon a series of observations and a careful consideration of various methods employed, Terson, of Toulouse, has been able to draw the following conclusions:

"1. Positive electrolysis should be applied to recent retinal detachment, and it will have the greater chance of success the sooner it is used after the onset of the accident.

"2. This method of intervention interferes in no way with the use of

all the methodical methods recommended for lesions of diathetic origin, the value of which has been shown by long experience from the palliative stand-point.

"3. Clinical observation and experiments on animals prove that the application of a current of five milliampères of one-minute duration is inoffensive to the eye."

A Clinical Study of One Hundred and Sixty-Seven Cases of Glaucoma Simplex. (*Archives of Ophthalmology*, vol. xxiv., No. 3, 1895.)

In an elaborate paper upon this subject, the findings of which are representative of a careful and extended examination made upon twenty-two thousand six hundred and eighty patients, seen in the services of Norris and Oliver, at Wills Eye Hospital, Zentmayer and Posey, of Philadelphia, embody their results into the following interesting and valuable conclusions.

"Simple glaucoma occurs in either sex with about the same degree of frequency, but manifests a preference for the eyes of males. The majority of cases occur in the beginning of the fifth decade. It is quite uncommon, occurring in about .736 per cent. of the cases which seek treatment at ophthalmic hospitals. All forms of ametropia are equally liable to this affection. With the exception of articular rheumatism and influenza, which appear to induce changes that favor its development, there are no other particular systemic diseases which predispose to it. It is a binocular affection, although a period of twenty months usually intervenes between the manifestation of the symptoms in the two eyes. The two most prominent subjective symptoms are failing sight and headache, but neither of these possess characteristics which would serve to differentiate them from those occurring in other forms of ocular disease. This form of glaucoma is slowly progressive, two and a half years being the average length of time required to induce blindness after the appearance of the initial symptoms. Signs of irritation in the anterior segment of the eye are usually absent, but 4.52 per cent. of the cases exhibit such changes. An inflammation of the optic nerve is a constant attendant upon glaucoma, being noted in every eye containing a pathologic excavation. It manifests itself as a low-grade neuritis affecting the entire structure of the nerve, and seems to render the nervous tissue more liable to the peculiar kind of excavation which is the most constant characteristic of glaucoma. No one of the four findings most commonly observed in glaucoma is essential to the disease, for the disease may occur without an excavation, without the field being contracted, without the diminution of central visual acuity, or without rise of tension. The excavation, however, is the most constant symptom, occurring in 81.43 per cent. of all the eyes which were examined. Although the excavation shows a marked predilection to occupy the temporal half of the disk, no part of the nerve escapes. In exceptional cases the excavation

appears at the temporal edge of the disk as a continuation of the physiological excavation. From here it gradually spreads over the head of the nerve, encroaching upon its structure until only a narrow rim of nerve-fibres remains at the nasal edge. Central visual acuity may remain normal although the field for form and color be encroached upon (in 10.77 of the cases).

"The tendency of the scleral ring to become visible all around the disk, and its disposition to broaden especially to the temporal side, are significant of the degree of intra-ocular tension to which the globe has been subjected, and go hand in hand with the extent and depth of the excavation. As the broadening of the ring, however, usually appears before the excavation, its presence in eyes possessing other symptoms of glaucoma should always excite suspicion of this disease.

"Opacities in the refracting media are found in an unusually large percentage (86.52 per cent.). These, however, are to be regarded as being more the result of senility than expression of the glaucomatous state. Arcus senilis (35.92 per cent.) and lenticular opacities (28.44 per cent.) are the most common, while corneal opacities, directly traceable to the increased intra-ocular tension, occurred in 20.38 per cent. of the eyes. Vitreous opacities occur in but few instances, and, originating in a choroiditis which complicates the disease, are not an essential feature of it.

"The cornea is the most liable of the refracting media to be affected by the glaucomatous process. The increase in intra-ocular tension as determined by palpation is not necessarily a constant factor, being detected in one hundred and nine cases (32.63 per cent.). Where the tension is increased, the field will be distinctly cut or the nerve excavated. Rigidity of the sclera is often the first indication of increased ocular tension. This rigidity may be accounted for either by a connective-tissue thickening in that tunic, or by an actual increase in the intra-ocular tension rendering the sclera more resistant to the examining finger. The shallowing of the anterior chamber exists in eyes where there is no excavation, but the converse is not true, for in every eye where there is an excavation the chamber will be shallowed. This would seem to show that the shallowing of the chamber occurred before the increased tension had excavated the nerve. As the chamber grows shallower and the tension higher the pupils will become larger, and the larger the pupil the less will there be reaction to light. This is not always true, however, for in twelve instances where the tension was distinctly elevated, and there were well-marked excavations, the pupils were but two and a half millimetres in size and they responded perfectly to light and convergence stimuli. Other signs of increased intra-ocular tension, such as the choroidal halo and the venous and arterial pulses occurring in such a small proportion of cases, show that they are not constant factors of the disease, and their absence cannot be regarded as negative evidence for the existence of a glaucomatous state. Increased tension limits the action of accommodation in only 34.88 per cent. of the cases.

In the great majority of the cases the limitation of the field consists in a concentric contraction for color and form to an equal extent.

"The consideration of the relative amount of contraction in the form and color field, often adopted in the distinction between an atrophic and a glaucomatous excavation, is valueless, as the findings show that in quite a large proportion (13.06 per cent.) of the cases the color field was relatively more affected than the form. Indeed, in sixteen of these thirty-two cases (50 per cent.) the form field was normal whilst that for red was contracted to twenty degrees or less. Contrary to the findings of other observers, the most frequent type of restriction of the visual field consists in concentric limitation of the entire field, and not in the contraction to the nasal side. The limitations of the field in this latter position in 7.92 per cent. of the cases evidenced that this portion of it was peculiarly liable to be affected by the glaucomatous process, for the other portions were not equally affected by the disease. Full fields are not inconsistent with glaucoma, for in one hundred and twenty-nine eyes where the state of the tension, the degree of the visual acuity, the character of the excavation, and the extent of the field were noted, thirty eyes did not exhibit any lessening in the extent of their fields for form or for color."

OBSTETRICS AND GYNÆCOLOGY.

IN CHARGE OF RICHARD C. NORRIS, M.D.,

Lecturer on Clinical and Operative Obstetrics in the University of Pennsylvania; Obstetrician-in-Charge, Preston Retreat; Visiting Obstetrician, Philadelphia Hospital; Gynæcologist, Methodist Episcopal Hospital; Consulting Obstetrician and Attending Gynæcologist, Southeastern Dispensary and Hospital for Women and Children.

Total Hysterectomy by a New Vagino-Abdominal Method. (*Annals of Gynæcology and Pædiatry*, September, 1895.) By Albert H. Tuttle, M.D., of Boston.

Preparation of the Patient.—When the result of an examination determines for the first time the requirement of hysterectomy, the physical and constitutional condition of the patient are carefully noted, and unless they are favorable for an operation she is placed on tonic treatment and the heart-beat regulated. Especial attention is paid to the examination of the urine and kidneys, which almost always show some defect; and unless there is about the normal secretion of solid constituents, operation is deferred.

If the uterus is enlarged and filled with soft cancerous or sarcomatous material, which for some time previously have been attended with exhausting discharges of a serous or bloody character, a preliminary thorough curettement, followed by rest in bed, will result in a very short time in the temporary improvement of the physical condition of the patient.

For a few days before the operation the patient is given a liquid diet

and kept quiet in bed. By packing the vagina daily for a week before the operation it will be stretched and softened considerably, and give greater facility for the after-manipulation. The day before the operation the bowels are thoroughly cleared of all fæcal matter, and made less septic by the administration of ten grains of calomel in one dose, about noon, followed by teaspoonful doses of magnesium sulphate every hour until several movements have occurred. The hair over the pubes is then shaved away, the patient given a warm bath and scrubbed with soap, rinsed with bichloride solution (1 to 5000), which is allowed to dry on, dressed in sterilized clothing, and put to bed, with a bichloride pad over the abdomen, between sterilized bedclothing.

For supper is given a hot drink of malted milk or similar food. On the morning of and at least four hours before the operation rectal enemata of warm water are repeatedly given until the return is clear, then a vaginal douche of bichloride (1 to 1000). The lower limbs are clothed with woollen wraps, two ounces of whiskey and twenty minims of freshly-prepared tincture of digitalis are administered by the rectum before the patient is taken to the operating-room, and at the beginning of the operation $\frac{1}{4}$ grain morphine, $\frac{1}{150}$ grain atropine, and $\frac{1}{10}$ grain strychnine are given subcutaneously in one dose.

In order to avoid all unnecessary length to the period of anæsthesia, the ether is not given until the preliminaries are nearly completed, and in the beginning is often substituted by the use of chloroform, either pure or in the form of the A.-C.-E. mixture.

Operation.—A short speculum is introduced into the vagina and the perineum depressed. With the help of vaginal retractors the cervix is exposed to view and drawn as far as it will come into the introitus by means of tenacula forceps. A probe is now passed, and the direction, shape, and size of the uterine canal determined. Unless the canal is freely patent it is dilated with Wathen's instrument and treated with equal parts tincture iodine and carbolic acid, applied on a cotton stick. The excess of iodine, blood, etc., are irrigated away, and, if the character of the disease is other than cervical cancer, the cervix is firmly held and a circular incision is made, simply cutting through the vaginal structures about the uterine neck, sufficiently remote from the uterus to include within it all diseased tissues, at the same time keeping as close as possible to the os, as in the usual manner of performing vaginal hysterectomy. In most cases this manœuvre is comparatively simple; but with a large tumor in a single woman somewhat advanced in age, with a rigid vagina, narrowed and elongated by long-continued upward traction exerted by the uterus as it is forced out of the pelvis to seek room for the growing tumor, and with a cervix perhaps almost entirely "taken up" by the distention exercised by the new growth, or with a senile uterus firmly fixed by old adhesions in the upper region of the pelvis, and nearly hidden from external inspection by the contraction of the vagina that occurs after a certain age, it is a matter of great diffi-

culty, and, contrary to what might be expected, little help will be gained by incision of the sphincter vaginæ.

The uterus is now separated from its anterior and posterior attachments and coverings as freely as possible by means of the finger or the handle of a scalpel, and then the cut margin of the vagina is caught with forceps and loosened sufficiently to allow it to be drawn together and sutured. A line of continuous suture is taken about one-quarter of an inch from the cut margin, and is like the ordinary purse-string suture, except that the first stitch, which is placed at the back, is carried around the vaginal artery, the suture drawn so as to leave both ends of even length in the vagina, the threads crossed, and then one side of stitches taken with one end and the other with the remaining end. In this manner the principal vessel is caught in a loop; and when the ends of the suture are drawn tight, not only is the vault of the vagina closed in, but also any tendency to hemorrhage from the vaginal artery is obviated.

A uterine stem[1] is then selected, according to the length of the cervix and size of the canal; with a soft uterus and large, easily dilatable cervix, one with wide thread is used, but with a cirrhotic organ one with a fine thread (even smooth) is preferable. The uterine stem is inserted and forced into place, after filling the cap with iodoform, either by simple pressure, or, in case one with a thread is used, by turning it up with a screw-driver; at the same time the cervix is held firmly by means of a pair of tenacula forceps fixed into the anterior and posterior lips. If the case is one of cervical cancer the stem must be inserted before any incision is made, and the contents of the uterus and infective parts tightly sealed by sewing the vagina to the edge of the metal cap with sutures taken through normal vaginal structure, sufficiently remote from the cervix to include all diseased tissue. One should then proceed as above described for non-infective cases. It is often advisable to tie a smooth stem into the cervix by means of one or more sutures, to prevent slipping.

The staff[2] is now inserted into the central cavity of the uterine stem and held in place by an assistant; the parts sponged clean and dry; a tampon of iodoform gauze packed into Douglas's pouch, under the peritoneum and between the cervix and bladder; and the ends of the purse-string-like suture

[1] The uterine stem is a device used to cork up the contents of the uterus, to give support and attachment to a staff used for elevating the uterus, and to serve as a guide for determining the position and limits of the cervix. It consists of a cap to cover the cervix and a central stem that fits into the canal, the whole being cast and turned from one piece of metal. The cap is concave on one side and convex on the other, has a groove in the edge for a director, and a number of T-shaped slots about the periphery for holding sutures. The central stem is smooth, or has a thread cut upon it, which serves to hold the instrument into the uterus when it is not fastened with sutures. Perforating the stem for the depth of an inch is a conical-shaped cavity, which receives the staff and holds it with a simple slip-joint.

[2] The staff is a steel rod bent on the curve of a prostatic catheter, except that the point is directed a little more outward and is made to fit the cavity of the stem.

drawn tight and tied, closing in the vault of the vagina below the cervix, gauze, and uterine stem, except for a small opening through which the staff passes. In exceptional cases, already mentioned, this careful toilet of the vagina is not only very difficult or impossible, but unnecessary and time-consuming, and should be omitted.

In these cases it is better simply to make a circular incision through the vagina, free the cervix, and then pack hard the whole vaginal cavity with sterile gauze. This elevates the uterus, pushes the ureters farther away to the sides of the pelvis, and serves as a guide during the dissection in the abdominal cavity. When this method is adopted the vault of the vagina can be closed in from the abdominal cavity. The patient is now placed in position for abdominal section with means ready for obtaining the Trendelenburg posture. The usual incision is made, and of variable length to meet the requirements of the case. The peritoneal cavity is opened at the upper angle of the wound, in order that before the opening is completed the position of the bladder may be determined and injury to it avoided. The incision is carried close to the pubes, to gain as much room as possible for working in the pelvis.

The contents of the abdomen are carefully inspected and the method of dissection determined. If the case is a simple enlarged uterus, with appendages approximately normal, the tumor is drawn out of the wound and to one side; the fold of broad ligament, including the tube and ovary of the other side, is put on the stretch, and a row of sutures passed below the ovary, from close to the side of the uterus to the free margin of the ligament, so as to include the ovarian artery. This line of sutures is inserted by means of a perineal needle; it is taken in the same manner as a shoemaker's stitch, but each stitch—which includes but a small amount of tissue—is drawn tight, and secured by taking a turn of the loose end of the suture about the other, so as to form a series of single knots. The uterus is then pulled over to the other side, and the remaining tube, ovary, vessel, and ligament secured in same manner. The ligaments are cut away above the ligatures, and between the points of their excision across the uterus in front and back about an inch above the attachment of the bladder anteriorly, and an inch above the cervix posteriorly, the peritoneal covering of the womb is incised. With the help of a scalpel handle, the bladder and peritoneum are now rapidly dissected up from the uterus in front until the line of former vaginal dissection is reached; the posterior layer of peritoneum is treated in the same manner: the sides of the uterus are freed from peritoneum as much as possible, when the lateral attachments, including the uterine artery, can be easily clamped and the organ cut away and removed. In cutting away the uterus keep as close as possible to that organ. During the dissection an assistant holds up the uterus firmly by means of the staff, which shortens and defines the neck and enables the operator to quickly and easily perform what is usually the most difficult part of the operation, the enucleation of the cervix. The gauze packing acts also as a guide, and

is of material assistance during this dissection. The uterine vessels are firmly ligatured with kangaroo tendon, the clamps removed, and all oozing of blood from the pedicles stopped by suturing. The anterior and posterior peritoneal flaps are brought together; the cut edges are turned in so as to bring the serous surfaces into contact, and the stumps containing the ovarian arteries are folded in at the angles so as to become extraperitoneal, the whole being closely united by a line of blind sutures, which when drawn tight are situated outside of the peritoneal cavity. All clots are removed by dry sponging, the abdominal wound closed layer by layer with animal ligature, and finally sealed with cotton and collodion.

Although ordinarily it is preferable to remove the ovaries, should one or both be found firmly bound down by old adhesions and in the condition of a small, hard mass, it is better to leave them *in situ* than to delay the operation by such time as is necessary for their removal. They will, as a rule, give rise to no further symptoms, as has been repeatedly demonstrated by vaginal hysterectomy, where often they must necessarily be left behind.

When a large multiple fibroid mass is encountered, the topography of the parts must be carefully studied, and the position of the bladder and (if possible) the ureters determined. If the growth forms with the uterus a single tumor, the same directions for operating as above described hold good; but where there are several distinct tumors, which are sessile in attachment and appear to have a very large pedicle, a sufficiently long cross incision is made through the peritoneal covering, and each tumor is enucleated as far as possible. By this means the pedicle will usually be found much smaller than expected, forming a part of the uterine attachment, and easily included in the clamp employed for securing the uterine vessels of the same side. Care must be taken in cutting and dissecting back of the peritoneal covering not to tear or injure the ureter, the position of which cannot always be recognized. If it is determined passing over the tumor, it should be dissected up and carried to one side with the overlying flap of peritoneum; but if it cannot be distinguished, any and all tissue which resembles it should be treated in the same manner; and as the clamps are applied prior to the final abscission, bear in mind the watchword of this operation, "*stick close to the uterus.*"

If, upon opening the abdomen, bladder, omentum, bowels, uterus, tubes, and ovaries present as a confused and conglomerated mass, firmly bound together by adhesions, the uterus can still be removed subperitoneally, as follows: A point is selected on the fundus of the uterus that is not obscured by adherent viscera, and a small cross-incision made through the peritoneal covering. The edges can then be picked up with forceps, the opening intelligently enlarged without injury to the adherent organs, and the peritoneum dissected from the uterus in every direction, well down on the sides, and sufficiently to admit of the easy adjustment of the clamps. The organ is cut away, the vessels secured, and the opening in the peritoneum closed as before, leaving the tubes and pelvis to drain *per vaginam*. In other

words, the uterus is removed by the combined method, with the same consideration for its surroundings which the French operators have when they extirpate by the vaginal method.

After the operation, shock is combated with saline rectal injections,—strychnine, morphine, atropine, caffeine, digitalis, nitro-glycerine, etc., as the case may require.

Six cases are added, illustrating the method of performing the operation.

MISCELLANEOUS.

Street Sanitation. (*National Board of Health Magazine*, June, 1895.) By Professor W. F. McNutt.

Street sanitation is a subject of vast importance to the people whose lives are spent in cities. The insanitary condition of our streets is a constant menace to health; they are never clean, filth of many kinds is allowed to accumulate on them. The air we breathe is loaded with poisonous materials and noxious gases, while the noises and jars of heavy teams on stone streets tell very severely on the nervous system. No street made of poor material, badly laid, can be kept in a sanitary condition. A smooth, even surface is absolutely necessary for cleanliness; while a hollow in a street surface is a trap for rubbish and moisture, a generator of noxious gases and of destructive germs. Further, a street surface should be slightly convex in the centre, just sufficient to let the water find its way to the gutters and, if on level ground, there should be a slight fall from the middle of the block, each way. The fire-plugs in these level blocks, instead of being placed at the street corners, as is invariably the case, should be in the centre of the block. So situated the fire-plugs are available for street washing, which is an absolute sanitary necessity, and the water answers the double essential purpose of flushing the sewers. Very much of the decomposition that takes place in the sewers is entirely preventable by providing well-fitting screens to the traps. Streets made with stone blocks, the spaces between which are filled with sand, are necessarily insanitary; it is impossible to keep them clean. Decaying rubbish, manure from horses, which contains the tetanus bacillus, glanderous discharge from animals, sputa from consumptives, typhoid and cholera bacilli, etc., accumulate in the sand between the blocks and are constantly carried about by the wind. In some cities the garbage and refuse materials from back yards and stables, which contain the discharges from typhoid or cholera patients or the poisonous bacilli of scarlet fever, diphtheria, consumption, glanders, etc., are carried through the streets in open, leaky wagons, leaving a trail of filth and poison behind them. Nothing can be more criminally careless and disgusting than the manner of carting dead animals through the streets on open carts; many of them having died of contagious diseases, their

poisonous secretions are deposited on crowded thoroughfares. A smooth surfaced street kept well swept, sprinkled before sweeping, and frequently well washed, reduces the chances of street contraction of contagious diseases to a minimum. Every garbage cart should be built and kept constantly under the surveillance of the health department. All garbage should be destroyed by fire. Another source of street contagion lies in our street-cars and public carriages. Every car and carriage should be carefully cleansed and fumigated at least once a week. Bitumen is as yet the only known material with which to construct a street that is capable of being kept in a sanitary condition. It should be the duty of the health department to prevent, as far as possible, the noises,—*i.e.*, air shocks and earth shocks. Nature has declared that rest and repose are essential restoratives and that no brain can do its best work that has not had a few hours freedom from air and earth shocks in every twenty-four hours. It is impossible to obtain this rest if the streets are paved with stone.

The Limits of the Physician's Duty to the Dependent Classes. (*American Medico-Surgical Bulletin*, September 1, 1895.) By James W. Walk, M.D.

The physician, a man and a citizen, owes a great duty to civilized society, a duty which is conditioned upon his special knowledge. Acquainted as he is with the important laws of heredity and the reciprocal influence of mental and physical states, the responsibility rests upon him to lead the community in which he lives to a higher civilization and to better modes of life. He should be a teacher of the people, and not only by training men to cure disease but, pre-eminently, a teacher of preventive medicine, that department of our science now almost new, but destined to become its pride and glory.

The question of his duty in regard to medical charities is much less simple. Here also an obligation rests upon him, as, for instance, in cases of sudden accident, etc. But this is a very small part of the so-called "charitable" work now thrust upon the profession. It is the common notion that the doctor should treat, free of charge, all the dependents in his neighborhood, and should also give his services to both public and private institutions. Institutions supported out of the tax-rate are, in no proper sense, charities. Their cost is levied upon all the citizens, in proportion to their taxable wealth, and there is no call for any one to serve them gratuitously. All others are paid for their services, but the physician is supposed to act from some principle not applicable to other sensible men.

Outside of the institutions supported by public taxes comes the yet wider field of the private charities. In these institutions it is right and fair that physicians should make contributions to them in service, if they see fit, but this right has its limitations. Free medical service to come within the definition of a wise and judicious charity should be rendered to those only who are unable to pay for it. To give it to others involves two wrongs:

the first, to the younger men of the medical profession who ought to have turned over to them those patients who are able to pay only small fees; the second, to the community, by the encouragement of pauperism and the undermining of independence.

Twelve years ago a somewhat thorough investigation of the dispensary system of the city of Philadelphia was made, and quite recently the same ground has been traversed with a similar result by a well-known physician of that place. In thirty-two free dispensaries there were treated in one year one hundred and sixty-one thousand and twenty-nine cases, which was about twenty per cent. of the entire population of the city, or one-fifth of all the people. Carefully compiled statistics show that, in Philadelphia, the actual pauper class does not exceed one per cent. of the population. If medical men do all of this vast work from charitable motives, certainly they need to be converted to a more judicious and discriminating doctrine of charity. If this service is rendered from selfish motives, the advantages derived from this free service have been greatly over-estimated. No medical man should indulge the pleasing delusions that the patients he treats at the dispensaries suppose him to be doing a noble and philanthropic act, and putting them under a corresponding obligation. In their view, the accommodation is generally the other way.

The valuable experience that may be gained by dispensary practice is often lost from lack of time to make a really scientific examination.

If, then, the duty of the physician to the dependent classes and also considerations of self-interest demand the restriction of free medical service, it is obvious that the existing system should be radically changed. Efforts made to restrict free aid to the indigent have, thus far, in almost every instance, failed through the opposition of the physicians themselves, who desire to have largely attended clinics. The very enormity of the evil may, however, lead to a powerful revulsion of sentiment, when means will readily be found to discriminate between the poor and those able to pay for treatment.

Obliteration of the Appendix Vermiformis. (*University Medical Magazine*, September, 1895.) By George A. Piersol, M.D., of Philadelphia.

The partial or total occlusion of the vermiform appendix due to retrogressive but non-pathological processes has been noted by a number of authors, but to Ribbert and Zuckerkandl we are indebted for extended and systematic observations.

Ribbert examined four hundred appendices, and found in ninety-nine, or twenty-five per cent., either partial or complete obliteration of the lumen, accompanied by marked alterations in the mucous and submucous coats. Of two hundred and thirty-two appendices examined by Zuckerkandl, in fifty-five, or 23.7 per cent., the involution processes were established. Evidences of obliteration are rarely found in the early years of life, but after the sixtieth year they are present in over half of the cases.

The appendix attains its fullest structural development between the tenth and the twentieth years. During this period the wall of the diverticulum consists of the four coats common to the gut-tract. The glands of Lieberkühn and the lymph-follicles are very numerous in the mucosa.

The writer thinks, with Zuckerkandl, that changes within the submucosa inaugurate the processes leading to the retrogression of the appendix and precede the alterations affecting the mucous membrane. These changes consist of a marked increase in the thickness of the submucosa, associated with a conspicuous aggregation of fat-cells. Later, the adipose tissue largely disappears, and the submucosa becomes contracted to a thin, fibrous layer.

Retrogressive changes in the mucosa consist of atrophy of the lymphatic follicles and of the glands of Lieberkühn, with a subsequent invasion by lymphoid cells. Finally, the opposed surfaces of the mucosa may unite, and all traces of the lumen may become effaced.

From the great frequency of these changes, the absence of indications of inflammatory action, the typical sequence of the changes, and the well-known tendency of similar rudimentary organs to retrogressive change, the conclusion arrived at by Ribbert, Wölfler, and Zuckerkandl, and accepted also by Berry, that these changes must be regarded as phases of a process of involution, seems the only one tenable.

The following advantages are claimed for imbrication:

1. A large, strong flap of any needed size to fill the internal ring. 2. Triplicate layers of aponeurosis. 3. Interlocking of layers giving broad surfaces of union. 4. Shortening of anterior as well as posterior wall of canal, making them mutually supporting and relieving tension on deep sutures. 5. Cord amply protected.

BOOK REVIEWS.

PATHOLOGY AND TREATMENT OF DISEASES OF THE SKIN, FOR PRACTITIONERS AND STUDENTS. By Moriz Kaposi, Professor of Dermatology and Syphilis and Chief of the Clinic and Division for Skin Diseases in the Vienna University. New York: William Wood & Co., 1895.

This translation of the last edition, the fourth presumably, of the "Pathologie und Therapie der Hautkrankheiten," of Professor Kaposi, makes accessible for the first time in English the well-known treatise of the distinguished Viennese dermatologist, who, as the successor of Hebra, is easily the first of those who compose the so-called Vienna School of Dermatology. Although text-books upon diseases of the skin have been multiplying of recent years with increasing rapidity, this is a welcome addition to the list, since the author's training, enormous experience, and eminent ability peculiarly fit him for the task of writing a text-book. The book is an eminently practical one, and but little space is given to matters of pure theory. The

opinions expressed, often rather dogmatically, it is true, are largely the result of the author's personal experience and observation in a field rich in material for study. In a few instances these opinions are at variance with those held by other equally eminent authorities. Varicella is declared to be identical with variola, an opinion which will find few supporters outside of Vienna. Paget's disease is declared to be but the accidental concurrence of eczema and carcinoma; and lupus vulgaris, concerning the tubercular nature of which the rest of the world is agreed, is not held to be a cutaneous tuberculosis, the presence of tubercle bacilli being regarded as accidental. Dermatitis herpetiformis, which the English, French, and American dermatologists have accepted as a distinct nosological entity, is dismissed with a few words as properly belonging to pemphigus.

The treatment of the various cutaneous diseases is largely—we had almost said, exclusively—local; internal medication plays a very subordinate part, in the author's opinion, in the treatment of diseases of the skin. While it is doubtless true that external remedies are often sufficient, yet we believe internal medication to be more useful than the reader of this book would be led to think. The translation is a free, rather than a literal one, and is in the main satisfactory; in a few instances, however, the translator has failed to render the German into its exact English equivalent. In conclusion, we only wish to add that this treatise, which has long held an enviable position, is one of the best in any language, and the translator has performed a real service in making it accessible to those who are unable to read it in the original.

M. B. H.

The Urine in Health and Disease, and Urinary Analysis, Physiologically and Pathologically Considered. By D. Campbell Black, M.D., L.R.C.S. (Edin.), F.F.P. and S. (Glas.), Professor of Physiology in Anderson's College Medical School; Physician to the Glasgow Public Dispensary (Department for Kidney and Urinary Diseases), etc., etc. Philadelphia: Lea Brothers & Co., 1895.

In the preparation of this book the aim of the author has been to combine conciseness with a treatment of the subject from a clinical and practical stand-point.

Dr. Black's reputation, as a careful and exhaustive writer on Bright's disease, renders criticism of the subject-matter unnecessary, and it need only be said that he has included in the volume under consideration the latest information to be found in this branch of medical science.

Part I. composes the anatomy and physiology of the healthy kidney, and the general properties of the urine.

Part II. treats of the normal elements and their chemical and physical characteristics. The section on urea and uric acid is especially good.

Part III. deals with the abnormal constituents, their chemical tests, pathological significance, and therapeutic indications. The lists of tests for albumin and glucose are very complete, and the fallacies of the principal tests are given. Transitory albuminuria is considered in an admirable manner, but the author's treatment of the subject of tube-casts seems too short to do the matter full justice, and entirely omits the microscopic technique, that would seem especially important in this connection.

The last three chapters include articles upon sediment, chemical analysis of calculi, and medicaments found in the urine.

It may appear that the practical value of the work is occasionally sacrificed to its completeness, in that too much attention is paid to rare elements and those of little clinical interest, and not enough to subjects of more vital importance to the practitioner. However, the book will be very useful, as a means of reference to those whose time is too much occupied to consult the extensive literature upon the subject.

J. D. S.

PATHOLOGY AND THERAPEUTICS OF DOMESTIC ANIMALS. By Dr. Friedberger, Professor of Veterinary Medicine in the School at Munich, and Dr. Fröhner, Professor of Veterinary Medicine in the School at Berlin. Translated from the most recent edition, with Annotations by Professor W. L. Zuill, M.D., D.V.S., late Professor of Surgery and Obstetrics in the Veterinary Department of the University of Pennsylvania; Member of the Academy of Natural Sciences of Philadelphia; Member of the United States Veterinary Medical Association; Member of the Philadelphia County Medical Society. Together with the Notes of the French Translators, and Selections from those of Professor Trasbot. In two volumes of about 600 pp. each. Price, $6 per volume, net (cloth binding). Philadelphia: William J. Dornan.

The translation of this admirable work will be welcomed not only by the veterinarian, but also by the student of comparative medicine unfamiliar with German. Friedberger and Fröhner are at the present time the foremost scientists in veterinary medicine in Germany, as well as the leading authorities in the world. How well this work is received is shown by the fact that it has been translated into Russian, French, and English, and has been adopted as the standard text-book in France and Russia. Professor William L. Zuill deserves the greatest credit for his elaborate and praiseworthy translation. He should feel fully compensated by the everlasting gratitude of the English-speaking veterinarians.

The first volume is in five sections, and comprises—I. Diseases of the Digestive Organs; II. Diseases of the Urinary Organs; III. Diseases of the Genital Organs; IV. Diseases of the Heart and Larger Blood-Vessels; V. Diseases of the Skin. Special mention deserves the chapter on colic, which is the best article ever written in any language on the subject. The description of toxic gastro-enteritis in its various forms is most exhaustive and up to date. The chemical analysis and the physical examination of the urine and the diseases of the kidney are admirably described in the second section. The description of heart-diseases is classic.

We are sorry to note that the valuable references to current literature are omitted from the translation, the explanation given in the preface being no excuse for the omission. They form a most valuable feature of the original, and could have been added without materially increasing the size or cost of the work.

R. J. F.

PRACTICAL DIETETICS, WITH SPECIAL REFERENCE TO DIET IN DISEASE. By W. Gilman Thompson, M.D., Professor of Materia Medica, Therapeutics, and Clinical Medicine in the University of the City of New York; Visiting Physician to the Presbyterian and Bellevue Hospitals. 8vo, pp. 800, illustrated. Cloth, $5; sheep, $6. New York: D. Appleton & Company.

This work occupies a place in practical medicine that has long been vacant, and comes to us to supply long-felt wants none too soon. The importance of dietetics in the treatment of disease is recognized by every one practising the healing art. And every one so engaged has often been greatly disappointed, on consulting the text-books concerning a matter of diet, to read "that a light but easily assimilated diet should be prescribed," or that "hydrocarbons should be taken, and carbohydrates should be avoided." The books of detachable diet-lists which have been published from time to time are unsatisfactory, but their usefulness is demonstrated by the ready sale with which they have met. The work under consideration replaces these lists and gives diet-tables under each disease, with practical hints on the choosing and combination of different articles found under their appropriate headings. Chapters are devoted respectively to diet in infectious diseases; diet in diseases of the respiratory system; diet in diseases of the circulatory system and blood; diet in diseases of the urinary system; diet in diseases of the alimentary canal; diet in diseases of the in-

testines; diet in diseases of the liver; diet in diseases of the nervous system, and diet in skin diseases. Special mention should be made of the admirable practical consideration of the diet in tuberculosis. The section on diet in typhoid fever contains a paragraph on the relation of intestinal antiseptics to diet. In the chapter on diet in disease of the alimentary canal a section is devoted to a hasty consideration of the examination of the stomach contents, which is followed by a section giving directions for test-meals. The diet for dyspeptics is treated of at length, while diarrhœas and constipation receive thorough consideration. A chapter is devoted to the diseases which are most influenced by diet, such as obesity, rheumatism, diabetes, scrofula, rachitis, scurvy, and hemorrhagic purpura, in which a summary of the different courses of treatment for these different conditions, as recommended by various authors, is given. Diets are given for surgical cases after the various operations. The rations of the army are given, as well as the dietaries of various hospitals. A valuable chapter is that on infant feeding. While the practical part of applied dietetics is treated of so fully, the theoretical side is not neglected, nor is it presented in such obscure technical language as to be ambiguous. The composition of foods, the economic value of foods, and a consideration of the various food materials occupy the first part of the book, together with a consideration of the various stimulants, beverages, and condiments. Food preparation and preservation, the quantity of food required, conditions especially affecting digestion, and the administration of food for the sick receive ample and lucid consideration. The volume is of distinct practical value, and the author is to be congratulated upon presenting to the profession a work which will answer all mooted questions upon the subject of which it treats.

J. M. S.

BOOKS RECEIVED.

F. A. DAVIS CO., PHILADELPHIA.

ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES, issue of 1895, edited by Charles E. Sajous, M.D., and seventy associate editors, assisted by over two hundred corresponding editors, collaborators, and correspondents. Illustrated with chromolithographs, engravings, and maps. In 5 volumes. Sold only by subscription. Price $5.00, in cloth.

LEA BROTHERS & CO., PHILADELPHIA.

GRAY ON NERVOUS AND MEDICAL DISEASES. By Landon Carter Gray, M.D., Professor of Diseases of the Mind and Nervous System in New York Polyclinic. New (second) edition. In one octavo volume of 728 pages, with 172 engravings and 3 colored plates. Cloth, $4.75; leather, $5.75.

TAYLOR ON THE PATHOLOGY AND TREATMENT OF VENEREAL DISEASES. By Robert W. Taylor, A.M., M.D., Clinical Professor of Venereal Diseases in the College of Physicians and Surgeons, New York. In one octavo volume of 1002 pages, with 230 engravings and 7 colored plates. Cloth, $5.50; leather, $6.50. 1895.

W. B. SAUNDERS, PHILADELPHIA.

SENN'S PATHOLOGY AND SURGICAL TREATMENT OF TUMORS. By N. Senn, M.D., Ph.D., LL.D., Professor of Practice of Surgery and Clinical Surgery, Rush Medical College.

AN AMERICAN YEAR-BOOK OF MEDICINE, edited by Dr. George M. Gould, editor of the Medical News. (In preparation.)

WILLIAM WOOD & CO., NEW YORK.

LOOMIS'S TEXT-BOOK OF PRACTICAL MEDICINE. Designed for the use of Students and Practitioners of Medicine. By Alfred L. Loomis, M.D., LL.D., Professor of Pathology and Practical Medicine in the Medical Department of the University of the City of New York; Visiting Physician to Bellevue Hospital, etc. Revised and enlarged, with two hundred and seven illustrations and one chromo-lithographic plate. Eleventh Edition. 1134 pages. Price, Cloth, $6.00; leather, $7.00.

P. BLAKISTON, SON & CO., PHILADELPHIA.

CLINICAL LECTURES ON DISEASES OF THE NERVOUS SYSTEM, DELIVERED AT THE NATIONAL HOSPITAL FOR THE PARALYZED AND EPILEPTIC, LONDON. By W. R. Gowers, M.D., F.R.S., Physician to the Hospital; Consulting Physician to University College Hospital. Pp. 279. Price, $2.

ITEMS OF INTEREST.

The Death of Louis Pasteur.

THE death of Louis Pasteur, chemist and biologist, on the 28th of September, 1895, from apoplexy, leaves Virchow *facile princeps* as the greatest survivor of those workers who wrought such marvellous changes in medicine during the middle decades of the present century. For the last few years he had not been actively engaged in laboratory work, often being absent from the Pasteur Institute at Paris for months at a time. His interest in the work there, however, never ceased, and it was one of his greatest pleasures to entertain at his own home some of the younger workers, in order to discuss the investigations which they were carrying on in his laboratory. The refusal of Pasteur to accept the Prussian order of the black eagle last summer gave rise to considerable newspaper talk, and was apparently due to his intense patriotism, which made him extremely popular among his fellow-countrymen. While not a physician himself, his discoveries made possible the achievements of Lister, and to him we really owe the foundation stones of antiseptic and aseptic surgery, and of our knowledge of the infections, fermentation, immunization, and preventive medicine. It is often stated that the scientific man is one who works for the love of science and not for any good which may result from his labors. Pasteur was not such a one; eminently practical in all his studies, he knew full well that the best method of avoiding an evil is to find its cause. Hence, the great monetary value of his work in connection with fermentation, sterilization, anthrax, and diseases of silk-worms. The work which first drew attention to him as an original investigator was upon crystallography, in regard to the allied compounds of tartaric acid, and on polarization of light to hemihedrals in crystals. In 1857, Pasteur proved that fermentation is a physiological function of

the yeast-cells, thus showing the correctness of the vitalistic or so-called germ theory of fermentation. He was the first one who produced fermentation on artificial nutritive media, consisting of water, sugar, ammonia, and ashes, mixed with a minimum of air-dust or hay-dust, and thus showed that organic substances are not necessary for the production of fermentation and putrefaction, as long as the micro-organisms can procure their carbon, nitrogen, and mineral salts. Next he was brought to experiment upon pure cultures of organisms. While Pasteur was able to prepare an antivaccine to hydrophobia, even his fertile genius and that of those associated with him have been unable to isolate the organism which gives rise to the symptoms. The many Pasteur institutes created in France and in different countries will probably prove the greatest factor in extending his renown to future generations.

The Index Medicus.

We sincerely trust that the many friends of the *Index Medicus* will not suffer this the most valuable contribution to medical literature to cease its existence from lack of support. On many visits to the library of the Medical School at Paris, the *Index Medicus* and the *Index Catalogue* of the Library of the Surgeon-General's Office, United States army, now completed, were always found to be in use. A self-constituted committee from Philadelphia, consisting of Drs. William Pepper, S. Weir Mitchell, H. A. Hare, De F. Willard, J. C. Wilson, H. C. Wood, J. William White, W. W. Keen, George M. Gould, John H. Packard, E. Laplace, and John B. Roberts, has agreed to appeal to the literary workers of the medical profession throughout the country to unite with them in reviving the *Index*. Each of these gentlemen has agreed to subscribe to the journal for a period of five years. It requires about $5000 annually to publish this monthly, and the publisher, Mr. George S. Davis, and the former editors, Drs. Billings and Fletcher, are willing to take up the work again if two hundred subscribers at $25 per year can be secured. The nature of this journal is such that it can never obtain a large subscription list, and every one who has ever worked with it should, therefore, consider himself a committee of one to secure a new subscriber. It should not be a difficult matter to raise at least $2000 from the advertisements, although it would be better if they could be dispensed with.

The Philadelphia County Medical Society, at their meeting held September 11, resolved to subscribe for two copies, and the Syracuse Academy of Medicine has taken one copy. From October 26 to November 5, sixty-two new names were received by the publisher, the total number of subscribers at that time being 174. This is so near the 200 mark that there can be but little doubt of the reappearance of the *Index*. Earnest efforts are being made also in Great Britain, through the influence of the *Lancet* and the *British Medical Journal*, to secure a list of subscriptions from that country.

In Holland, the papers for the patent of a new automaton[1] have just been issued, the use of which may rival to a certain extent even the dangers of the much-abused free dispensary service or the "counter" prescribing of the druggist. The apparatus consists of the figure of a pedantic-looking doctor, in the body of which are to be found numerous slots labelled with the names of various diseases. The get-well-quick-and-cheaply patient suffering, we will say, from headache, merely drops his coin into the proper opening and receives a powder which is warranted to be an infallible remedy for all varieties of cephalalgia. For stomachic troubles the ever-ready "bitters" are at hand.

An Automaton Physician.

For scientific and economic reasons, Boyce and Herdman,[2] of Liverpool, have made investigations relating to the life conditions of the oyster under normal and under abnormal environment. The effects upon the oyster of water contaminated by sewage and by normal and typhoid fæces are noted; also the fate of the typhoid organism in the oyster, and the length of time required to render infected oysters harmless. The methods employed include four different series of observations. In the first series a portion of the oysters were sunk five fathoms deep in the bay, others were deposited in a shore pool, but in clean water, and still others were placed in close proximity to a drain-pipe. A second series were conducted in the laboratory,—oysters being placed in stagnant sea water, in aerated sea water, and in that in which the salinity was gradually reduced. Another series were fed with different kinds of food, such as living protophyta and protozoa, oatmeal, flour, sugar, earth, etc. A fourth series were placed in sea water to which either healthy fæcal matter, typhoid stools, or pure cultures of the typhoid bacillus were added. These experiments demonstrate the beneficial effects of aeration by the addition of air only, or by change of water by tidal currents or otherwise. Oysters can live for long periods in sewage-contaminated water or water containing fæcal matter. Protophyta and protozoa are the best food for oysters. Those fed on oatmeal and flour after a time sickened and died, while the exceedingly harmful action of sugar is noted. A bacteriological examination of the water from the pallial cavity and from the rectum of the oyster showed but few colonies of micro-organisms in oysters laid down in the open water of the bay, while in those placed in proximity to the drain-pipe the number was enormous. Oysters grown in water infected with the typhoid bacilli showed no apparent increase of the bacilli, but these could be identified in cultures made from the water of the pallial cavity and rectum fourteen days after infection. The typhoid

Oysters and Typhoid.

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[1] Korrespondenzblatt der ärztlichen Kreis- und Besirksvereine im Königreich Sachsen, October 15, 1895.

[2] Science, October 11, 1895.

bacillus will not flourish in clean sea water, and it would seem that oysters previously contaminated with sewage could be freed of pathogenic organisms or their products by carefully subjecting them to a natural process of cleaning in unpolluted water.

Has a Case of Argyria ever been posted?

Dr. W. Murray[1] submits two cases of the power of nitrate of silver to cure epilepsy, the price of the cure being argyria,—in one of the cases, however, so mild as to be unnoticed by the patient. He asks if a patient stained with nitrate of silver has ever been posted. Dr. C. Frommann (Virchow's Archives, 1859, vol. xvii. p. 135) describes a case of argyria in which the intestine, liver, kidneys, spleen, skin, etc., were carefully examined microscopically. In this case the silver nitrate was used in the treatment of epilepsy. In Riemer's case (Arch. d. Heilk., 1875, vol. xvi. p. 296) the drug was used for tabes. Both of the articles are well illustrated. v. Kahlden has prepared and studied some beautiful sections from rabbits fed with silver nitrate for seven months (Ueber die Ablagerung d. Silbers in d. Nieren, Beitr. v. Ziegler, vol. xv.).

The Vapor of Formalin as a Disinfectant.

Formalin, or formic aldehyde, has many uses at the present time. The latest idea is to prepare it in the form of vapor, by the incomplete combustion of wood spirit. This is accomplished by means of a spiral of platinum wire wound round the wick of an ordinary spirit-lamp or of a specially constructed lamp, so that the spiral projects half an inch or so above the top of the wick. Combustion continues to go on after the flame has been blown out, the wire remaining incandescent while the spirit undergoes a change from alcohol to aldehyde,—in the case of ethyl alcohol to acetic aldehyde, and in that of methyl alcohol to formic aldehyde. The vapors of formalin are said to have no injurious effect upon furniture and metal fittings. As this method of preparation would probably be expensive, it would have no advantage over the simple evaporation or boiling of the ordinarily prepared liquid.

The Cure of Tuberculous Peritonitis.

The statement, quoted by Dr. Shattuck in his article on "Tuberculous Peritonitis," in the last number of the INTERNATIONAL MEDICAL MAGAZINE, from Flint's "Practice of Medicine," edited by Dr. F. P. Henry, that peritoneal tuberculosis is invariably fatal, is to be found in the last edition. In the chapter on pleuritis (p. 43), the following interpolation by the reviser has, however, been inserted: "The fact that a patient recovers from a

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[1] Lancet, September 21, 1895.

pleurisy does not necessarily indicate that it is non-tubercular, for tubercular processes in serous membranes, such as the peritoneum and pleura, are often remarkably benign."

Executioner's Fees in ye Olden Time.

The following items,[1] taken from an account paid to the public executioner during the history of *vieux Paris*, have been brought to light in connection with the discussion now going on in France in regard to the abolition or to the changing of the character of the death penalty.

	Livres.
To cooking a malefactor in oil	48
To quartering while living	30
To affording a criminal passage from this life to the next world by the sword	20
To breaking the body upon the wheel	10
To fixing his head upon a pole	10
To cutting a man into four pieces	36
To hanging a culprit	20
To laying out the corpse	2
To impaling a living man	24
To burning a sorceress alive	28
To flaying a living man	28
To drowning an infanticide in a sack	24
To dumping a suicide along the road	20
To torturing	4
To applying the thumbscrew	2
To applying the buskins	4
To giving the Gehenna torture	10
To putting a person in the pillory	2
To flogging	4
To branding with a hot iron	10
To cutting off the tongue, the ears, or the nose	10

The Gross Prize of One Thousand Dollars.

The Philadelphia Academy of Medicine have made the announcement that the second quinquennial prize of one thousand dollars, under the will of the late Samuel D. Gross, M.D., will be awarded January 1, 1900. The conditions annexed by the testator are that the prize "shall be awarded every five years to the writer of the best original essay, not exceeding one hundred and fifty printed pages, octavo, in length, illustrative of some subject in surgical pathology or surgical practice, founded upon original investigations, the candidates for the prize to be American citizens." It is expressly stipulated that the successful competitor, who receives the prize, shall publish his essay in book form, and that he shall deposit one copy of

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[1] Le progrès médical, August 3, 1895.

the work in the Samuel D. Gross Library of the Philadelphia Academy of Surgery. The essays, which must be written by a single author in the English language, should be sent to Dr. J. Ewing Mears, 1429 Walnut Street, Philadelphia, before January 1, 1900.

NOTE TO CONTRIBUTORS.

AUTHORS will receive liberal compensation for accepted articles upon publication; or reprints, if stated on the manuscript, will be furnished in lieu of the honorarium. It is distinctly understood that all articles appearing as original matter are for our exclusive use, and are not to be reprinted or to appear in any other publication excepting the Transactions of the society before which the paper may have been read. Illustrated papers are especially desired.

All matters of business, as well as subscriptions, should be sent to the INTERNATIONAL MEDICAL MAGAZINE COMPANY, 716 Filbert Street, Philadelphia.

Manuscripts, exchanges, and books for review should be addressed to the Editorial Office, 3709 Spruce Street, Philadelphia.